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ABSTRACT

A study examined the relative effectiveness of three alternative delivery systems for secondary vocational education--vocational high schools, comprehensive high schools, and area vocational centers. It also ascertained how well secondary vocational education is serving women, minority groups, handicapped individuals, economically disadvantaged persons, and persons with limited English proficiency. Data were from the High School and Beyond National Longitudinal Survey. Among vocational majors, men were relatively more numerous in vocational high schools and area vocational centers. Vocational high schools enrolled relatively more blacks and low-ability and low socioeconomic status (SES) students than did the other two types of schools. The trade and industry specialty was the most popular in vocational high schools and area vocational centers, the business specialty in comprehensive high schools. Although women were predominantly enrolled in business, the majority of women attending vocational high schools specialized in trade and industry. The effect of delivery systems on earnings was negligible when compared with the effects of students' characteristics and environmental factors. The only significant findings of a delivery system effect on earnings was a negative one for area vocational centers compared to comprehensive high schools. Findings provided a basis for questioning the popular notion that area vocational centers produce a better payoff. (YLB)

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VOCATIONAL EDUCATION DELIVERY SYSTEMS AND SPECIALIZATION: IMPACT ON GROUPS OF SPECIAL INTEREST

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TABLE OF CONTENTS

LIST OF FIGURES AND TABLES v

FOREWORD vii

EXECUTIVE SUMMARY ix

CHAPTER 1. INTRODUCTION 1

Overview 1
Organization of Report 5

CHAPTER 2. METHODOLOGY 7

Conceptual Framework 7
Sample 11
Sources of Data 17
Analysis 18

CHAPTER 3. RESULTS 21

Characteristics of Students 21
Vocational Curriculum Patterns 27
Vocational Specialty Patterns 32
Multivariate Analyses 43

CHAPTER 4. SUMMARY AND CONCLUSIONS 57

Principal Findings 58
Interpretation and Policy Considerations 60

APPENDIX 61

REFERENCES 67

LIST OF FIGURES AND TABLES

Figure		Page
1	Conceptual framework showing the variables that influence labor market outcomes	8
Table		
2.1	COMPARISON OF TYPES OF SCHOOLS SAMPLED FOR THE HS&B AND SUPPLEMENTAL HS&B	13
2.2	HS&B SAMPLE AND SCREENS	15
2.3	COMPARISON OF HS&B VOCATIONAL STUDENTS BETWEEN THE TOTAL SAMPLE AND SCREENED SAMPLE	16
3.1	RACE/ETHNICITY AND GENDER BY SOCIOECONOMIC STATUS FOR EACH TYPE OF DELIVERY SYSTEM	22
3.2	RACE/ETHNICITY AND GENDER BY HANDICAPPED STATUS FOR EACH TYPE OF DELIVERY SYSTEM.	24
3.3	RACE/ETHNICITY AND GENDER BY ENGLISH PROFICIENCY STATUS FOR EACH TYPE OF DELIVERY SYSTEM	25
3.4	RACE/ETHNICITY AND GENDER BY ACADEMIC ABILITY FOR EACH TYPE OF DELIVERY SYSTEM	26
3.5	SOCIOECONOMIC STATUS BY ACADEMIC ABILITY FOR EACH TYPE OF DELIVERY SYSTEM	28
3.6	RACE/ETHNICITY AND GENDER BY CURRICULUM PATTERN FOR VOCATIONAL HIGH SCHOOLS	29
3.7	RACE/ETHNICITY AND GENDER BY CURRICULUM PATTERN FOR COMPREHENSIVE HIGH SCHOOLS	30
3.8	RACE/ETHNICITY AND GENDER BY CURRICULUM PATTERN FOR AREA VOCATIONAL CENTERS	31
3.9	SOCIOECONOMIC STATUS BY CURRICULUM PATTERN FOR EACH TYPE OF DELIVERY SYSTEM	33
3.10	HANDICAPPED STATUS BY CURRICULUM PATTERN FOR EACH TYPE OF DELIVERY SYSTEM	34

3.11	RACE/ETHNICITY AND GENDER BY SPECIALTY FOR VOCATIONAL HIGH SCHOOLS	35
3.12	RACE/ETHNICITY AND GENDER BY SPECIALTY FOR COMPREHENSIVE HIGH SCHOOLS	36
3.13	RACE/ETHNICITY AND GENDER BY SPECIALTY FOR AREA VOCATIONAL CENTERS	37
3.14	SOCIOECONOMIC STATUS BY SPECIALTY FOR VOCATIONAL HIGH SCHOOLS	39
3.15	SOCIOECONOMIC STATUS BY SPECIALTY FOR COMPREHENSIVE HIGH SCHOOLS	40
3.16	SOCIOECONOMIC STATUS BY SPECIALTY FOR AREA VOCATIONAL CENTERS	41
3.17	HANDICAPPED STATUS BY SPECIALTY FOR EACH TYPE OF DELIVERY SYSTEM	42
3.18	EFFECTS OF SETS OF VARIABLES ON HOURLY WAGES FOR ALL WORKERS	44
3.19	EFFECTS OF SETS OF VARIABLES ON MONTHLY EARNINGS FOR ALL WORKERS	45
3.20	EFFECTS OF DELIVERY SYSTEMS ON HOURLY WAGES AND MONTHLY EARNINGS FOR ALL WORKERS	47
3.21	EFFECTS OF DELIVERY SYSTEMS ON HOURLY WAGES AND MONTHLY EARNINGS FOR ALL MALES AND FEMALES	50
3.22	EFFECTS OF DELIVERY SYSTEMS ON HOURLY WAGES AND MONTHLY EARNINGS FOR LOW SES GRADUATES	53
3.23	EFFECTS OF DELIVERY SYSTEMS ON HOURLY WAGES AND MONTHLY EARNINGS FOR BUSINESS AND INDUSTRY MAJORS	54

FOREWORD

The relative effectiveness of secondary delivery systems in contributing to their vocational education graduates' labor market success has received little attention. However, the Carl D. Perkins Vocational Education Act has identified this problem area as one deserving further research. Virtually no systematic research has been conducted to determine whether three delivery systems--comprehensive high schools, vocational high schools, and area vocational centers--contribute differently to the success of their vocational education graduates in the labor market. The purpose of this study was to examine labor market outcomes for special subgroups of the population and for graduates who have specialized in different vocational education areas. These preliminary findings provide a basis for further research regarding the effectiveness of alternative vocational education delivery systems. On that basis, other researchers will find the report useful. In addition, the report's recommendations are directed toward policymakers to assist them in improving the three delivery systems.

The study was conducted using data from the High School and Beyond Longitudinal Survey (HS&B), the high school transcripts of a subsample of the HS&B panel, and the Supplemental Data Collection for HS&B. The HS&B database and transcript data collection efforts were funded by the National Center for Education Statistics (NCES). The availability of transcript data permitted a more precise classification of students into high school curriculum patterns and vocational education specialty patterns. The Supplemental Data Collection was carried out through the Consortium for the Study of Effective Schools. These data enabled more accurate classification of students into the three delivery systems.

The National Center wishes to express its appreciation to the Office of Vocational and Adult Education, U.S. Department of Education, for funding the analysis of the HS&B database. This project was conducted in the Evaluation and Policy Division of the National Center for Research in Vocational Education under the direction of N.L. McCaslin, Associate Director.

We wish to thank the Project Director, Paul Campbell, and Debra Bragg, Research Specialist, for their leadership while the study was being conducted. We are grateful to Marie Parks, Program Assistant, and Mary Beth Dauner, Program Assistant, for their assistance in preparing the text, tables, and figures. In addition, we appreciate contributions to the conceptualization of the study made by Karen Basinger, Graduate Research Associate, and Phyllis Panzano, former Program Associate. Herbert Parnes, a

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Robert E. Taylor
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EXECUTIVE SUMMARY

Although vocational educators have debated the merits of comprehensive high schools versus vocational schools, little empirical examination of vocational delivery systems has occurred. This study has responded to the mandate of the Carl D. Perkins Vocational Education Act and considered the relative effectiveness of alternative delivery systems for secondary vocational education. In addition, the study has examined how well these systems have served certain subgroups of the population: women, minority groups, the handicapped, the economically disadvantaged, and persons with limited proficiency in speaking English. It has considered effectiveness in terms of labor market success, specifically hourly wages and monthly earnings. It has considered service to subgroups of the population through examining both access and effects.

The best national data available to examine the relative effectiveness of delivery systems were found in the High School and Beyond (HS&B) National Longitudinal Survey. These data were further supplemented by transcripts of a subsample of HS&B students. These transcripts enabled accurate classification of students according to their intensity of participation and specialization in vocational education. The Supplemental HS&B database was used to determine the type of delivery system in which each student had participated--a full-time vocational high school, a comprehensive high school, or an area vocational center. The analyses were carried out on about 12 percent of the original HS&B cohort. This reduced sample of students had enrolled fairly intensively in one of the vocational education specialty areas, either in a vocational high school, a comprehensive high school, or an area vocational center.

The primary forms of analyses were cross-tabulations and multiple linear regression. In the regression equations, student and environmental characteristics were controlled to determine the effects on subsequent labor market success of (1) intensity of vocational education participation, (2) field of specialization, and (3) participation in one of the three vocational delivery systems. Labor market success was measured in terms of hourly wages and monthly earnings.

Among vocational majors, men are relatively more numerous in vocational high schools and area vocational centers than in the comprehensive high schools. Vocational high schools enroll relatively more blacks than do the other two types of schools. They also have a larger proportion of low socioeconomic status (SES) students. Further, they enroll larger proportions of low-ability students than the comprehensive high schools and area

vccational centers, but this pattern is primarily evident among the white students rather than among the blacks.

Students in vocational high schools are considerably more likely to concentrate quite intensively in their vocational specialties than are their counterparts in either the area vocational centers or comprehensive high schools. The Trade and Industry specialty is the most popular in the vocational high schools and area vocational centers, whereas the Business specialty is the most prevalent vocational major in the comprehensive high schools. Although women are predominantly enrolled in Business, the majority of women who attend vocational high schools elect to specialize in Trade and Industry.

The labor market outcomes do not support the popular notion of the superiority of the area or vocational schools over the comprehensive high schools. In fact, the regressions indicate that the effect of delivery systems on earnings was negligible when compared to the effects of students' characteristics and environmental factors. The only significant finding of a delivery system effect on earnings is a negative one for area vocational centers compared to comprehensive high schools. The vocational high schools do not differ from the comprehensive high schools. This negative effect of area vocational centers prevailed in regressions for all workers, for male workers, and for graduates of Trade and Industry programs.

Policy implications are drawn based on these preliminary findings. Based on the evidence at hand, an unquestioned acceptance of the seemingly popular notion that area vocational centers produce a better payoff is unwise (for example, see Committee for Economic Development [1985, pp. 33-34]). A policy directed toward providing better information is clearly in order so that the mandates of the Carl D. Perkins Act of 1984 may be adequately fulfilled.

CHAPTER 1

INTRODUCTION

Overview

Vocational education has the goal of increasing students' educational opportunities and thereby enhancing their social and economic status. More specifically, it is designed to accomplish the following objectives: (1) to meet society's need for skilled workers, (2) to increase individual options to achieve desired outcomes, and (3) to provide an understanding of the relevance of education to work (Evans 1978, p. 4).

Vocational education prepares individuals for employment in occupations that require less formal education than the baccalaureate degree. The proportion of high school students who have participated in vocational education is quite high. According to Swanson (1982), almost 24,000 high schools offer a mixture of vocational and nonvocational courses. About one-fourth of these schools offer vocational courses in five or more vocational education service areas.

The National Center for Education Statistics (NCES 1984) reported the frequency of enrollment in the various curricula, based on the High School and Beyond (HS&B) survey, to be 27 percent vocational, 37 percent academic, and 36 percent general. These were self-reports of high school seniors in 1982, however. When the transcripts of these seniors were analyzed, enrollment in vocational courses was found to have occurred even more frequently than self-report data suggested. About 72 percent of the seniors had enrolled in at least 1 occupational or vocational course and 89 percent had enrolled in at least 1 exploratory vocational course at some time during high school.

Since passage of the Vocational Education Act in 1963, many policy studies have been conducted to determine the effectiveness of vocational education in comparison to other types of high school curricula. A large body of research has evolved that has focused upon the relative advantages of vocational versus general or academic graduates in the labor market. Findings from these studies have produced mixed results. Mertens et al. (1981) reviewed a number of studies that showed no significant differences in earnings between vocational and nonvocational graduates. A number of other studies reviewed by Mertens et al., however, indicated initial earnings advantages for vocational graduates. Yet, frequently these earnings advantages disappeared over time. Similar conclusions were drawn by Wiley and Harnischfeger (1980), Meyer and Wise (1979), and Conroy

(1979) using the National Longitudinal Study of the High School Class of 1972 database.

Further research has indicated that intensity of enrollment in vocational education, specialization in specific vocational service areas, and training-related job placement following graduation have influenced labor market outcomes. These findings have revealed that enrolling intensively in vocational education has been related to increased wage rates when vocational graduates have been employed later in jobs related to their training (Campbell and Basinger 1985; Rumberger and Daymont 1980).

Wage advantages have been identified for both men and women who have enrolled in certain vocational service areas. Several studies using nationally representative longitudinal surveys have found significant earnings advantages for women who have been trained in Business (Grasso and Shea 1979; Campbell et al. 1982; Meyer 1981; Gustman and Steinmeier 1981; Mertens and Gardner 1981). These studies have indicated that women who specialized in Business had higher rates of pay and higher annual earnings than women who did not specialize in this area. Wage advantages were not associated with specializing in other vocational service areas. In fact, Meyer indicated a slight wage disadvantage for women who specialized in Nonoccupational and Occupational Home Economics. However, Meyer indicated the wage disadvantage was so small that it barely merited mentioning.

The evidence is mixed as to whether there have been significantly positive earnings effects for males, especially for white males. Analysis of data from the Class of 1972 survey found only small earnings effects for vocational education males who specialized in Trade and Industry (Meyer 1981; Campbell et al. 1982). However, Woods and Haney (1981) found a disadvantage in hourly earnings for male Business specialists, mixed results for male Trade and Industry specialists, and wage advantages for Marketing and Distributive Education specialists.

Certainly, as findings from previous research have revealed, determining the impact of vocational education programs has been difficult, especially in comparison to academic and general education programs. Positive effects of vocational education have occurred under some circumstances but not others. For that reason, more information is needed about vocational education programs and the way those programs influence student outcomes. This research must take into account characteristics of vocational education programs that are most likely to produce favorable student outcomes.

In this context, an important policy question that has received very little attention concerns the relative effectiveness of alternative vocational education delivery systems. One reason this area has received little attention is the diversity of these delivery systems. Across the United States, fiscal policies and planning practices of secondary delivery systems of vocational education are usually carried out by State and local educational agencies. Federal policy and funds provide a guide, but not a mandate, for administrators of these State and local programs. As a consequence, the nature and possibly the effectiveness of delivery systems within States and localities may vary. However, the Federal guidelines tend to ensure that some similarities exist among delivery systems throughout the United States.

Generally, the country has three types of secondary delivery systems that offer vocational education programs. These delivery systems are comprehensive high schools, area vocational centers, and vocational high schools. Comprehensive high schools offer predominantly academic and general courses and some vocational courses, according to a 1981 report of the NCES. The majority of students in comprehensive high schools are not enrolled in vocational education programs. However, a substantial number of students take one or two courses (Campbell, Orth, and Seitz 1981). Comprehensive schools are structured to meet the diverse needs of students with many educational interests. Conant (1967) explains that the system is labeled comprehensive because

> it provides under one roof (or series of roofs) secondary education for...students with different vocational and professional ambitions and with various motivations. It is responsible for providing good and appropriate education, both academic and vocational. (p. 3)

A second type of delivery system is the area vocational center. Some comprehensive high schools have joined other schools or districts to form area vocational centers (Swanson 1982, p. 31). Students in area vocational centers may attend on a part- or shared-time basis for vocational courses, whereas the general and academic courses are offered at the adjoining comprehensive high school. There are about 1,250 area vocational centers in the United States.

Separate vocational schools began to emerge in a number of large city districts in some States during the 1960s (Conant 1967, p. 58). As is the case with comprehensive schools, there is a great deal of variation among vocational schools, largely due to local administration of these schools. Vocational high

schools specialize in vocational education programs, with general and academic courses offered as a supplement. All, or at least a majority, of students who attend vocational high schools are enrolled in vocational education programs. There are over 200 specialized vocational or technical high schools in the Nation's urban centers.

A study on systems and facilities conducted by the U.S. Office of Education (1978), investigated three types of delivery systems that offered five or more vocational education programs. The study revealed that vocational high schools were usually located in urban areas, whereas comprehensive high schools and area vocational centers were usually located in suburban and rural areas.

The physical condition of institutions located in urban, as opposed to suburban or rural, areas tended to vary. Generally, vocational high schools located in central cities needed a great deal of maintenance. Over 60 percent of vocational institutions in large cities were described as in need of maintenance or replacement, whereas less than 40 percent of those in suburban areas, smaller cities, and rural areas were described similarly. About 10 percent of vocational institutions in suburban and rural areas were described as in need of replacement.

No research studies have been identified that compare labor market outcomes for vocational graduates of the three types of delivery systems. Most of the evidence regarding the quality of vocational programs offered through various delivery systems is anecdotal in nature. One such anecdotal study was conducted by Benson and Hoachlander (1981). These researchers reported that specialized schools such as vocational high schools and area vocational centers offered vocational education programs of generally higher quality than those of comprehensive high schools. These conclusions were based on site visits to seven large cities. The differences in quality were partly accounted for by the selection procedures used by vocational high schools and area vocational centers. These schools were attracting more highly qualified students than comprehensive high schools, partly as a consequence of selective admission. However, these selection procedures were limiting access to vocational education programs for minorities, women, the handicapped, the disadvantaged, and students with limited English proficiency.

Three other reasons were given for limited access to specialized vocational programs. They were the geographic isolation of these programs, limitations on enrollments, and restricted job entry. So, although the students served by vocational schools were receiving higher quality vocational education, according to Benson and Hoachlander (1981), not all students appeared to have equal access to these programs.

The Carl D. Perkins Vocational Education Act of 1984 called for evaluation of the relative effectiveness of vocational education delivered through comprehensive and area vocational versus vocational high schools. The most general statement of the problem is: Are there differences in labor market outcomes depending on whether vocational education participation occurs in vocational high schools, comprehensive high schools, or area vocational centers? This study responds by examining the relative effectiveness of three delivery systems in contributing to the labor market success of their vocational education graduates. In addition, the study seeks to ascertain whether the answers vary for (1) different subgroups of the population and (2) different vocational education specialties.

The following four research questions describe the study's objectives more precisely:

- How do the characteristics of vocational education students in vocational high schools, comprehensive high schools, and area vocational centers differ?
- What differences exist among vocational high schools, comprehensive high schools, and area vocational centers in (1) the specialties pursued by vocational education students and (2) the intensity of students' concentration in vocational education?
- Controlling for other factors, are there differences among vocational high schools, comprehensive high schools and area vocational centers in contributing to the labor market success of vocational education graduates as measured by hourly rate of pay and monthly earnings?
- Is there evidence of differential effectiveness of vocational high schools, comprehensive high schools, and area vocational centers according to the gender and socioeconomic status of students and their vocational education specialties?

Organization of Report

The remainder of this report describes the conceptual framework, methodology, and results of this study. Chapter 2 contains a description of the HS&B database, the conceptual framework, and the methodology for the study. Chapter 3 discusses the descriptive findings and labor market outcome results. Finally, chapter 4 contains a summary of the report, conclusions, and policy recommendations.

This report is one of two recently completed studies that examine the effects of participation in vocational education by special population groups. The other report (Campbell et al. 1986) emphasizes the relative advantages of differing degrees of concentration in vocational education in relationship to academic and general education for special population groups. Labor market outcomes are a primary focus of this report.

CHAPTER 2

METHODOLOGY

This chapter describes the sample, sources of data, and methods of analysis used to address the following major research foci of this study:

- The characteristics of vocational education students who participate in vocational high schools, comprehensive high schools, and area vocational centers
- The differences in patterns of participation and specialization in vocational education among students who participate in the three delivery systems
- The differences in labor market success among vocational education graduates of the three delivery systems
- The differences in labor market success among vocational education graduates in the three delivery systems according to graduates' gender and vocational education specialty

Conceptual Framework

The conceptual framework presented in figure 1 provides an overview of the variables examined in this study. The framework illustrates the relationships among variables investigated through the third and fourth research questions. In order to ascertain the independent effects of the several delivery systems and the interrelationships between these and special subgroups of the population, it is necessary to control statistically for sets of variables that influence outcomes. The three boxes across the top of the framework show the categories of variables of major interest in this study: special populations, secondary educational experiences, and labor market outcomes. The framework illustrates the influence that special population affiliation and secondary educational experiences may have on labor market outcomes. The four boxes across the bottom of the figure show other variables that must be statistically controlled if valid answers to the research questions are to be obtained. (See appendix A for more detailed operational definitions of variables presented in the model.)

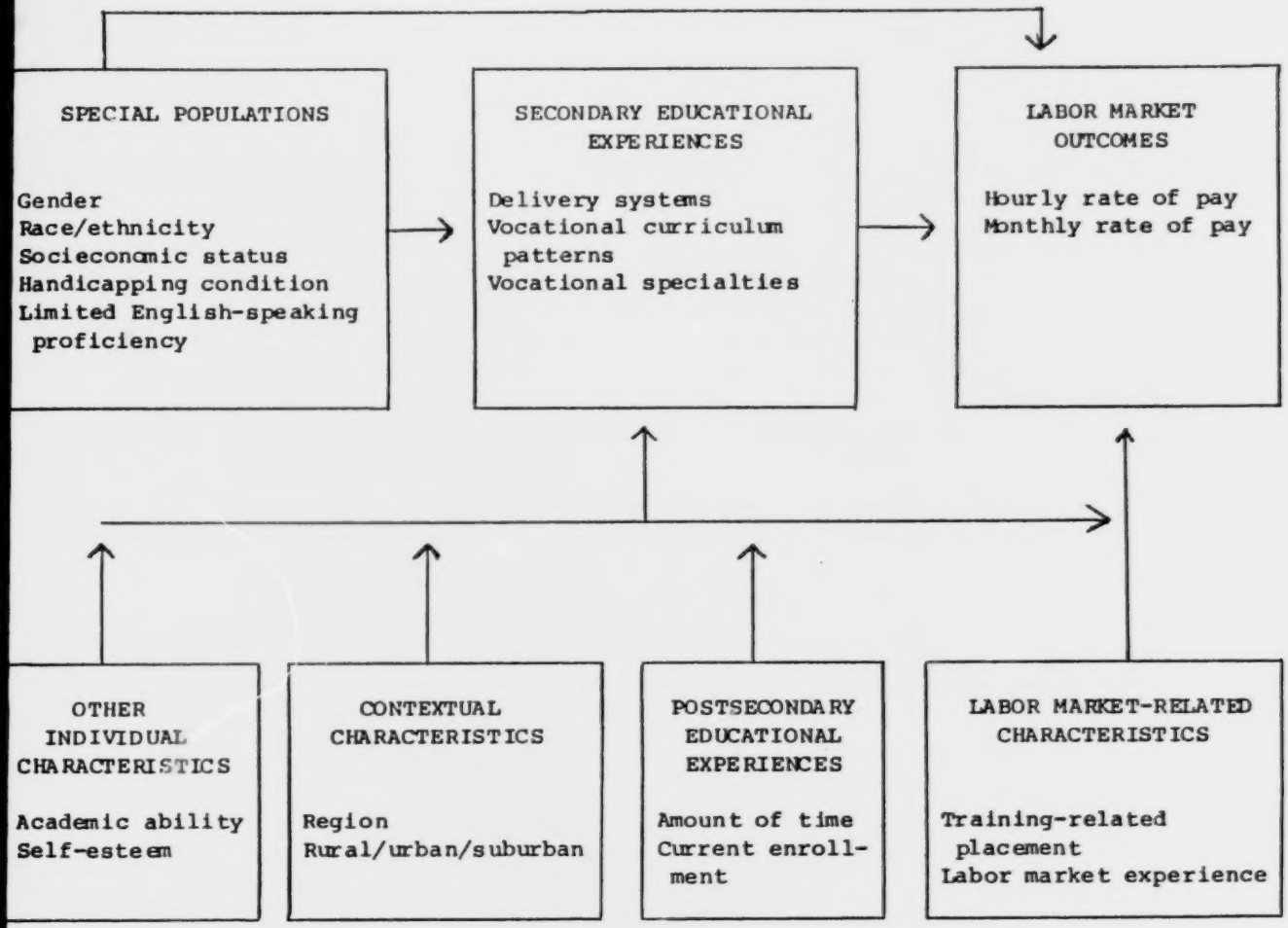

Figure 1. Conceptual framework showing the variables that influence labor market outcomes.

The conceptual framework presented in figure 1 identifies the categories of variables used in this study. The dependent variables are the logarithms of hourly and monthly earnings, which reflect rates of pay received by members of the sample in their current jobs according to their self-report. Two sets of variables were explored in relation to these dependent variables. These two sets reflect the special subgroups of the population and the secondary educational experiences of students--the principle explanatory variables investigated in this study.

Principle Explanatory Variables

The special subgroups of the population considered were the following groups: women and minority groups (blacks, Hispanics, and others), persons with handicapping conditions, persons with low socioeconomic status (SES)--also referred to as the economically disadvantaged, and persons with limited English-speaking proficiency (LEP). These groups were selected for study because of their identification in the Carl D. Perkins Vocational Education Act. The operational definitions of each of these special populations and of the other concepts discussed in the remainder of this chapter are contained in appendix A.

There were three major categories of secondary education variables used in the analysis: (1) alternative delivery systems, (2) patterns of vocational education participation, and (3) area of specialization in vocational education. Each of these will be described in turn. The delivery systems include vocational high schools, comprehensive high schools, and area vocational centers. As has been noted, the Carl D. Perkins Vocational Education Act mandates examination of these alternative arrangements.

The second category identifying the high school experience variables is the pattern of vocational education participation. Campbell et al. (1981) found that participation in vocational education varies greatly; they report that 78 percent of the National Longitudinal Survey of Labor Market Experience (NLS) New Youth Cohort enrolled in vocational education for at least 1 credit. The patterns of participation were developed by operationalizing five concepts: (1) number of credits received in vocational courses in the program area of specialization; (2) number of program areas in which courses were pursued; (3) number of vocational credits in the program area that were determined to be supportive of the specialty area; (4) a scaled measure of whether the specialty was pursued through the upper grades; and (5) number of years in which the specialty (for example, agriculture or distributive education) was taken.

Three patterns that emerged from this classification scheme were examined. The first was the Concentrator grouping, which includes students who had taken an average of 6 vocational credits over 3 years. The second group, Limited Concentrators, generally had taken about half as many vocational credits as Concentrators, usually within a 2-year span. The next pattern group, Concentrator/Explorers, was similar to the Limited Concentrators except that the vocational course work was usually completed early in the high school years.

The third major category of secondary educational experience is the vocational student's area of specialization. Specialties within vocational education include Agriculture, Trade and Industry, Distributive Education, Health Occupations, Occupational Home Economics, and Business. The program area in which a student had a majority of vocational education credits was identified as that student's area of specialization. Previous research conducted by Grasso and Shea (1979), Meyer (1981), and Mertens and Gardner (1981) has established that the specialties of students are associated with their wages after graduation.

Control Variables

In addition to the two sets of explanatory variables--special subgroups of the population and secondary school experiences--described in the preceding paragraphs, four sets of control variables were included in the regression analyses. The first set contains two important characteristics of the individual: academic ability and self-esteem. Academic ability is a composite of scores obtained by students on reading, vocabulary and math tests. Self-esteem is obtained based on students' responses in 10th grade to several survey questions. These two variables were controlled because of evidence that each is related both to high school educational experience and to subsequent earnings (Campbell and Basinger 1985).

The second set of control variables, contextual characteristics, represents regions of the country and the rural, urban, or suburban location of schools. These variables served as proxies for differing labor market conditions. For example, the wages of rural workers were expected to be lower than for workers in other parts of the United States, regardless of their vocational education participation.

The third set of control variables relates to postsecondary educational experience. Since the 1980 High School and Beyond (HS&B) sophomores had only completed high school in 1982 and data were collected only through 1984, the postsecondary

educational experiences of those in the sample were quite limited. However, a variable was created to identify the amount of time a respondent had spent in postsecondary education and whether or not the individual was enrolled in 1984, when the data were collected. The relationship between completing college-level or more advanced degrees and higher wages has been documented extensively. Additionally, Campbell and Basinger (1985) identified a wage penalty for high school graduates who were currently enrolled in postsecondary education or had enrolled but not completed education at that level. These students probably had lower wages because they were working part-time or lacked the 4-year credential needed to obtain higher paying jobs.

Finally, the fourth set of control variables includes labor-market-related characteristics. The first of these classified employed respondents according to whether their jobs were related to their training. Rumberger and Daymont (1982) documented a relationship between placement in jobs related to students' vocational education courses and higher wages. The second labor market control variable measures the amount of time the 1980 HS&B sophomores had been in the labor force. The variable was included because of the substantial evidence of a positive relationship between labor market experience and earnings.

Sample

The study involves the presentation of descriptive data and multivariate analyses of longitudinal databases. These are the HS&B database that was developed and supported by the National Center for Education Statistics (NCES) and the Supplemental Data Collection for HS&B conducted by the National Opinion Research Center (NORC) through the Consortium for the Study of Effective Schools. These databases were used in tandem to examine longitudinal statistical data collected between 1980 and 1984 about the employment experiences of individuals who were high school sophomores in 1980.

HS&B

The HS&B database consists of information collected from a representative National sample of about 30,000 high school sophomores and 28,000 seniors who were surveyed originally in 1980 and resurveyed in 1982 and 1984. The present study focuses only on the individuals who were at the sophomore level in 1980. These 30,000 sophomores were enrolled in 1,015 public and private schools. To allow for studies of certain types of schools or students, the highly stratified National probability sample

oversampled Hispanics, Catholic schools with high proportions of black students, and public alternative schools with high-achieving students. The Hispanic supplement to the sample was funded jointly by the Office of Bilingual Education and Minority Language Affairs, and the Office for Civil Rights in the U.S. Department of Education.

The first HS&B follow-up survey was conducted in 1982 with the 30,000 individuals who were sophomores in 1980. All students selected in the base year had a probability of inclusion in the first follow-up, and unequal probabilities were compensated for by weighting. About 85 percent of the 1980 sophomores were enrolled in the same school in which they had completed the base year survey in 1980. Of the 1,015 schools in the base year, 975 were in the first follow-up. An additional 17 schools were included to represent institutions that had received a group of transfer students from the base year schools.

The second follow-up was conducted in 1984 among a subsample of 18,152 of the 30,000 1980 sophomores included in the first follow-up. Almost all of these respondents had authorized release of their transcripts during the first follow-up data collection effort in 1982. In total, 13,682 1980 sophomores provided data during the second follow-up in 1984.

Supplemental HS&B

The Supplemental HS&B Data Collection (Supplemental HS&B) sample was drawn from the secondary schools selected for the HS&B database. The final Supplemental HS&B sample consisted of 532 schools. These included 95 percent of the private schools, 50 percent of the regular and alternative public schools, and 30 percent of schools with a high proportion of Hispanics that were included in the HS&B base year survey. Table 2.1 describes the types of schools sampled by the HS&B base year survey and the Supplemental HS&B Database (Jones, Knight, and Ingels 1984). All schools that offered vocational education--409 of the schools surveyed--were asked to provide data about the program via the administrator of the vocational education program. These data were important to the analyses carried out during this study.

Sample of Vocational Students for Present Study

The present study focuses exclusively on public high school graduates of vocational education programs. Accordingly, the HS&B sample of 29,737 1980 high school sophomores was screened

TABLE 2.1

COMPARISON OF TYPES OF SCHOOLS SAMPLED
FOR HS&B AND SUPPLEMENTAL HS&B

School Type	HS&B	Supplemental HS&B	
	Base Year	Total	Percentage of HS&B Base Year
Regular public	735	370	50
Alternative public	45	21	47
Cuban-Hispanic public	11	4	36
Other Hispanic public	102	32	31
Regular Catholic	45	42	93
Black Catholic	30	28	93
Cuban-Hispanic Catholic	9	2	22
Elite, Other private	11	11	100
Other private	27	22	81
Totals	1,015	239	54

to include only about 3,700 members. These 3,700 members had enrolled fairly intensively in vocational education, had a vocational specialty, and had participated in one of the three types of vocational delivery systems. Table 2.2 shows several screens that were applied to the original HS&B sample.

About 3,500 students were dropped from the total HS&B sample because they attended private schools, and almost 3,000 were dropped because they failed to graduate from high school. Of the remainder, the largest number of original sample members were excluded from the present study because their transcripts confirmed that they had not graduated from vocational education programs. This accounted for 10,545 of the original HS&B sample members. However, others were dropped because it was impossible to determine whether they had taken their vocational training in comprehensive high schools or in area vocational centers.

In table 2.3, a comparison was made between vocational education majors in the total HS&B sample and the screened HS&B sample used for this study. These data indicate that the race/ethnicity and gender of students in each sample were very similar. There was less than 2 percentage points difference in the race/ethnicity and gender categories between the two samples. The two groups with this amount of disparity were white males and females. Based on these data, there was no reason to believe that the screens had altered the database significantly or affected the generalizability of findings to the particular groups of interest.

In order to classify vocational education graduates as participants in area vocational centers, it was necessary to identify graduates who left a comprehensive high school to receive their vocational education at an area vocational center. The identification procedure required determining, first, intensity of participation and, second, specialization in vocational education for each respondent. Third, administrators must have indicated that students could take vocational courses away from their primary school facility. It was necessary at this point to use supplemental HS&B data to categorize students in the area vocational centers. For that reason primarily, there was a substantial reduction in sample size.

The sample for the present study, therefore, consists of graduates of vocational education programs classified as Concentrators, Limited Concentrators, Concentrator/Explorers and self-report. There were 2,708 vocational graduates of comprehensive high schools, 601 vocational graduates who attended area vocational centers, and 469 graduates of 20 full-time vocational high schools. The last group includes 105 students who reported having academic or general high school curriculum

TABLE 2.2

HS&B SAMPLE AND SCREENS

HS&B Sample Size	Number Deleted	Effects of Screens
29,737		Total HS&B Sample
26,212	3,525	Deleted students at private schools
23,346	2,866	Deleted dropouts
23,308	38	Deleted students with unclassifiable data
21,260	2,048	Deleted students with no transcripts and bad self-report data
10,715	10,545	Deleted students who had an academic or general high school program
3,893	6,822	Deleted students whose educational programs or schools were invalid or undetermined
3,778	115	Deleted students with invalid vocational education profiles or specialties
3,673	105	Deleted students with academic or general majors who were enrolled in vocational high schools
1,210	2,463	Deleted students who could not be classified as working full-time or part-time

TABLE 2.3

COMPARISON OF HS&B VOCATIONAL STUDENTS
BETWEEN THE TOTAL SAMPLE AND SCREENED SAMPLE

Race/Ethnicity and Gender	Total Sample	Screened Sample
White		
Male	3,921	1,341
	33.69	35.49
Female	4.010	1,224
	34.46	32.40
Black		
Male	628	227
	5.40	6.01
Female	788	271
	6.77	7.17
Hispanic		
Male	1,044	335
	8.97	8.87
Female	925	263
	7.95	6.96
Other		
Male	177	72
	1.52	1.91
Female	144	45
	1.24	1.19
Total	11,637	3,778
	100.00	100.00

NOTE: The data presented for the total HS&B sample were obtained from analysis conducted by Campbell et al. (1986).

majors. This group was included in descriptive tables, as all students who attended full-time vocational high schools were expected to have an interest in or have participated to some degree in vocational education. However, this group was excluded from regression analyses that required identification of students' intensity of participation in vocational education as well as their area of specialization.

Sources of Data

Data were collected for HS&B through mail questionnaires, tests, and existing records, including student transcripts. All of the 1980 sophomores responded to a base year questionnaire that requested information on high school experience, work experience, personal and family background, attitudes, self-esteem, and plans for the future. In addition, the sophomores took cognitive tests on vocabulary, reading, mathematics, science, writing, and civics. Also, teachers and a principal in each school were asked to complete questionnaires to describe the school environment and assess the knowledge of students in HS&B.

The first follow-up survey was administered in 1982. The data collection procedures were nearly identical to those used in 1980. Questionnaires and cognitive tests were completed by the 1980 sophomores again in 1982. Two versions of the questionnaire were used; one was designed for students still in school and the other for students who had left school because early graduation, transfer, or dropout. An additional measure of school environment was obtained from an administrator in each school.

Also in 1982, student transcripts were collected for a subsample of the 1980 sophomores. The transcripts contained information for each secondary-level course taken. Each course included a six-digit course identification number, year and term the course was taken, the credits earned, and the final grade. Courses that were a part of a special curriculum or program (e.g., bilingual education, special education programs for gifted students) were so identified. In addition, each record included information on the student's rank in class, overall grade point average, number of days absent, number of days of suspension, the date and reason the student left school, and identifying codes and scores for standardized tests (PSAT, SAT, ACT, or advanced placement tests).

The study accessed data from the HS&B base year survey, follow-up surveys, and trancripts to address the research questions. In addition, the Supplemental HS&B database was used to

determine the type of delivery systems that students had participated in. The primary means of determining participation in vocational education in comprehensive high schools or area vocational centers was through use of the supplemental HS&B data.

Similarly to the HS&B data collection, mail surveys were used for the Supplemental HS&B database. The questionnaires were designed to be completed by five different groups: teachers, principals, guidance counselors, vocational coordinators, and community service coordinators. In each school, data were collected from up to 4 administrators and from up to 30 teachers who were randomly selected. In smaller schools, an attempt was made to collect, at a minimum, data from a school administrator and guidance counselor at each school.

Analysis

Several types of statistical analysis were used to address the study's four research questions. In the case of the first two research questions regarding the characteristics of students in different vocational education delivery systems, curricular patterns, and areas of specialization, cross-tabulations were prepared to describe the distribution of the sample across the variables of interest. The cross-tabulations were stratified by type of delivery system so that the characteristics and educational experiences of students enrolled in vocational high schools, comprehensive high schools, and area vocational centers could be compared.

In order to analyze the third and fourth research questions, multiple linear regression was used. The sample was narrowed at this point to the 1,210 HS&B sophomores who were working either in full-time or part-time jobs. First, a hierarchical regression was used to examine the relative contribution of two explanatory sets of variables representing special subgroups of the population and secondary educational experiences to labor market success. First, the sets of control variables were entered into each regression equation. This hierarchical regression was conducted according to specifications of Cohen and Cohen (1983). In each hierarchical regression analysis, the sets were ordered as follows: control variables, special subgroups of the population, patterns of vocational education participation, vocational education specialties, and delivery systems. An F-ratio was calculated for the change in R^2 as each set of variables was added to the model. This F-ratio and R^2 provided evidence of the degree to which each set of variables predicted hourly and monthly wage rates for the employed vocational education graduates.

The last step of the hierarchical model was analyzed in greater depth. This model contained all variables specified in the conceptual framework presented at the beginning of this chapter. Each of the parameter estimates corresponding to the independent variables was examined. These parameter estimates were interpreted based on an a priori alpha level of 0.05. This multiple linear regression analysis permited conclusions to be drawn about differences in labor market success among vocational graduates of the three delivery systems, as well as among special subgroups of the population, graduates of different specialties, and graduates who had different levels of intensity of participation in vocational education.

Finally, to address the fourth research question, separate multiple linear regression analyses were conducted for men and women, low SES vocational graduates, and for Business and Trade and Industry specialists. Initially, similar analyses were planned for each of the special populations and specialty areas, including such groups as Hispanics, blacks, the handicapped, and LEP students. These additional analyses proved to be impossible because of small sample sizes. However, the overall analyses permitted conclusions to be drawn regarding differences in hourly wages and monthly earnings as a consequence of affiliation with special subgroups or various types of vocational education participation.

CHAPTER 3

RESULTS

The primary purpose of this research is to determine the relative effectiveness of the three different vocational education delivery systems: comprehensive high schools, vocational high schools and area vocational centers. This problem is approached via a multivariate analysis later in the chapter. We first turn to tabular analysis to shed light on the first two research questions outlined in chapter 1: (1) whether there are differences in clientele among the three types of vocational delivery systems and (2) whether the systems differ according to the curriculum patterns of their students.

Characteristics of Students

The characteristics of students that are compared across the three types of vocational education programs are gender, race/ethnicity, socioeconomic status (SES), the presence or absence of a physical or mental handicap, and the presence or absence of limited proficiency in the English language (LEP).

Race/Ethnicity and Gender

According to the data in table 3.1, there are some important differences in race/ethnicity and in gender among the students of vocational high schools, comprehensive high schools, and area vocational centers. First, the proportion of students by race and ethnicity varies substantially between vocational high schools and the other two delivery systems. Blacks comprise almost three-tenths of the students in vocational high schools but only one-tenth of those in the other two types of systems. These differences are offset by differences in the proportions of whites; the proportions of Hispanics and others are about the same in each delivery system.

Second, the proportion of men is considerably higher in vocational high schools and in area vocational centers than in comprehensive high school programs (about two-thirds versus one-half). In the comprehensive high school programs, women actually outnumber men (52 versus 48 percent).

Socioeconomic Status

Also evident in table 3.1 are differences in the SES of students enrolled in vocational high schools, comprehensive high

TABLE 3.1

RACE/ETHNICITY AND GENDER BY SOCIOECONOMIC STATUS
FOR EACH TYPE OF DELIVERY SYSTEM

Race/ Ethnicity and Gender	Vocational						Comprehensive						Area Vocational					
	Total n and %	SES					Total n and %	SES					Total n and %	SES				
		Low	2nd	3rd	High	Missing		Low	2nd	3rd	High	Missing		Low	2nd	3rd	High	Missing
White																		
Male	173						885						283					
	39.77	24.01	26.42	18.25	20.96	10.37	34.65	20.27	24.68	31.02	21.19	2.84	49.33	23.52	30.32	23.77	19.85	2.53
Female	87						980						157					
	18.73	32.49	36.15	24.37	5.90	1.09	38.79	23.53	28.27	27.46	19.37	1.37	26.67	21.54	25.88	29.93	21.10	1.54
Black																		
Male	63						131						33					
	14.25	37.00	35.55	14.97	8.48	4.00	4.36	41.19	28.41	16.01	8.96	5.43	6.07	50.29	29.05	5.04	10.93	4.69
Female	71						181						19					
	13.56	49.58	31.01	11.54	0.42	7.45	5.97	57.55	17.60	13.63	6.66	4.56	3.96	60.44	25.80	13.76	0.00	0.00
Hispanic																		
Male	33						249						53					
	7.08	36.48	11.68	38.67	10.17	2.99	7.07	33.13	32.42	21.99	11.21	1.25	7.35	42.31	34.72	18.80	4.18	0.00
Female	22						206						35					
	4.25	52.81	2.44	31.53	7.18	6.04	5.78	49.67	22.45	12.53	14.11	1.24	4.21	59.34	21.92	13.07	5.67	0.00
Other																		
Male	16						42						14					
	2.05	50.53	17.65	13.43	0.00	18.38	2.17	14.97	47.81	12.96	15.15	9.11	1.89	32.05	34.35	23.67	0.00	9.92
Female	4						34						7					
	0.32	100.00	0.00	0.00	0.00	0.00*	1.21	38.65	27.57	23.65	6.42	3.71	0.53	37.66	34.62	7.93	19.79	0.00
Total n and %	469	155	144	92	46	32	2708	791	692	700	459	66	601	176	172	133	105	15
	100.00	33.81	27.84	19.87	11.73	6.75	100.00	27.39	26.76	25.76	17.66	2.42	100.00	29.20	28.95	22.98	16.73	2.13

NOTES: *Weighted percentage was not calculated, as weights were missing. Percentages are weighted; numbers are unweighted.

schools, and area vocational centers. A higher proportion of students are of low SES in vocational high schools (34 percent) than comprehensive high schools (27 percent) or area vocational centers (29 percent). Of course, as SES levels increase, students are less likely to enroll in any of the three types of delivery systems. This pattern is most pronounced in vocational high schools, where 34 percent of the students are in the low SES quartile and only 12 percent are in the high SES quartile.

The concentration of the lowest SES students in vocational high schools is due largely to overrepresentation of low SES white females in this type of delivery system. The same pattern is much less pronounced among white males and is not discernible at all among blacks or Hispanics.

Handicapped Status

Table 3.2 shows that the proportion of handicapped students ranges between 16 percent in area vocational centers and 11 percent in comprehensive high schools. There are some interesting interactions among handicap status, race/ethnicity, and gender. For whites, regardless of delivery system, a higher proportion of males than females are handicapped. The opposite is true for blacks, where a higher proportion of women are handicapped. For Hispanics, the proportions of men and women who are handicapped differ substantially among the delivery systems. In vocational and comprehensive high schools, a higher proportion of Hispanic men are handicapped than of Hispanic women. In area vocational centers, the opposite is true.

Limited English Proficiency

Only about 1 percent of all students in each delivery system are LEP (table 3.3).* The incidence is, of course, highest among Hispanics and among those of "other" races. The extent of variation among the several delivery systems is not large enough to permit meaningful generalization.

Academic Ability

Distributions by academic ability levels are shown in table 3.4. Vocational schools have the largest proportion of

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*Due to the limited number of LEP students, descriptive analyses were not presented regarding the specialization and the intensity of participation in vocational education of LEP students.

TABLE 3.2

RACE/ETHNICITY AND GENDER BY HANDICAPPED STATUS
FOR EACH TYPE OF DELIVERY SYSTEM

Race/ Ethnicity and Gender	Vocational			Comprehensive			Area Vocational		
	Total n and %	Not Handicapped	Handicapped	Total n and %	Not Handicapped	Handicapped	Total n and %	Not Handicapped	Handicapped
White									
Male	173			885			283		
	39.77	86.86	13.14	34.65	89.28	10.72	49.33	84.75	15.25
Female	87			980			157		
	18.73	94.19	5.81	38.79	91.67	8.33	26.67	87.07	12.93
Black									
Male	63			131			33		
	14.25	86.24	13.76	4.36	88.50	11.50	6.07	89.06	10.94
Female	71			181			19		
	13.56	81.00	19.00	5.97	86.29	13.71	3.96	72.48	27.52
Hispanic									
Male	33			249			53		
	7.08	81.14	18.86	7.07	82.06	17.94	7.35	74.54	25.46
Female	22			206			35		
	4.25	91.43	8.57	5.78	90.61	9.39	4.21	67.87	32.13
Other									
Male	16			42			3		
	2.05	76.05	23.95	2.17	91.61	8.39	1.89	100.00	0.00
Female	4			34			0		
	0.32	27.06	72.94	1.21	78.69	21.31	0.53	92.07	7.93
Total	469	411	58	2708	2410	298	601	513	88
n and %	100.00	86.73	13.27	100.00	89.48	10.52	100.00	84.01	15.99

NOTE: Percentages are weighted; numbers are unweighted.

TABLE 3.3

RACE/ETHNICITY AND GENDER BY ENGLISH PROFICIENCY STATUS
FOR EACH TYPE OF DELIVERY SYSTEM

Race/ Ethnicity and Gender	Vocational				Comprehensive				Area Vocational			
	Total n and %	Primarily English Speaking	Limited English Speaking	Missing	Total n and %	Primarily English Speaking	Limited English Speaking	Missing	Total n and %	Primarily English Speaking	Limited English Speaking	Missing
White												
Male	173				885				283			
	39.77	97.58	0.92	1.49	34.65	99.40	0.46	0.14	49.33	98.88	0.33	0.78
Female	87				980				157			
	18.73	100.00	0.00	0.00	38.79	99.56	0.38	0.07	26.67	100.00	0.00	0.00
Black												
Male	63				131				33			
	14.25	95.79	2.52	1.69	4.36	99.15	0.00	0.85	6.07	100.00	0.00	0.00
Female	71				181				19			
	13.56	100.00	0.00	0.00	5.97	99.64	0.00	0.36	3.96	100.00	0.00	0.00
Hispanic												
Male	33				249				53			
	7.08	98.11	1.89	0.00	7.07	92.35	4.88	2.77	7.35	88.52	6.80	4.68
Female	22				206				35			
	4.25	86.20	12.57	1.22	5.78	93.02	6.49	0.49	4.21	91.96	6.82	1.21
Other												
Male	16				42				14			
	2.05	93.99	6.01	0.00	2.17	97.48	2.52	0.00	1.89	100.00	0.00	0.00
Female	4				34				7			
	0.32	100.00	0.00	0.00	1.21	93.77	6.23	0.00	0.53	78.96	21.04	0.00
Total n and %	469	457	7	5	2708	2646	48	14	601	582	13	6
	100.00	97.60	1.52	0.89	100.00	98.49	1.16	0.36	100.00	98.16	1.06	0.78

NOTE: Percentages are weighted; numbers are unweighted.

TABLE 3.4

RACE/ETHNICITY AND GENDER BY ACADEMIC ABILITY
FOR EACH TYPE OF DELIVERY SYSTEM

Race/ Ethnicity and Gender	Vocational						Comprehensive						Area Vocational					
	Total n and %	Academic Ability					Total n and %	Academic Ability					Total n and %	Academic Ability				
		Low	2nd	3rd	High	Missing		Low	2nd	3rd	High	Missing		Low	2nd	3rd	High	Missing
White																		
Male	173						885						283					
	39.20	20.95	31.02	32.47	11.16	4.39	34.42	12.67	26.38	32.10	26.53	2.33	49.64	13.86	29.51	31.95	21.89	2.79
Female	87						980						157					
	19.43	24.72	36.37	26.20	11.16	1.55	38.94	13.91	29.37	34.65	21.04	1.03	26.43	11.78	31.09	29.42	26.22	1.49
Black																		
Male	63						131						33					
	14.43	29.59	40.36	17.18	11.16	1.71	4.34	44.48	35.84	14.58	4.31	0.79	5.88	41.45	32.22	23.16	3.16	0.00
Female	71						181						19					
	13.01	46.33	42.77	5.09	3.96	1.85	5.96	51.81	28.65	15.10	4.26	0.17	3.99	52.97	41.36	5.66	0.00	0.00
Hispanic																		
Male	33						249						53					
	7.34	61.05	26.08	10.79	0.00	2.08	7.12	45.60	28.55	16.30	9.08	0.47	7.40	47.98	24.87	14.66	10.80	1.69
Female	22						206						35					
	4.14	51.08	26.40	14.87	7.64	0.00	5.80	43.03	40.18	8.77	6.67	1.35	4.24	52.27	27.50	10.09	0.00	7.14
Other																		
Male	16						42						14					
	2.12	42.68	28.24	19.72	9.35	0.00*	2.18	50.78	18.43	15.35	11.64	3.79	1.90	9.00	14.71	41.16	22.39	12.75
Female	4						34						7					
	0.33	27.06	72.94	0.00	0.00	0.00*	1.23	44.05	26.45	9.77	19.73	0.00*	0.53	80.21	0.00	0.00	19.79	0.00
Total	469	142	160	96	50	21	2708	619	793	730	525	41	601	136	177	154	118	16
n and %	100.00	30.90	34.46	22.79	9.18	2.66	100.00	22.19	28.87	28.20	19.29	1.44	100.00	21.03	29.69	27.52	19.31	2.45

NOTES: *Weighted percentage was not calculated, as weights were missing. Percentages are weighted; numbers are unweighted.

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low-ability students--31 percent compared to 22 percent in comprehensive high schools and 21 percent in area vocational centers. The prevalence of low-ability students in vocational high schools can be attributed primarily to whites; the same pattern is not observed in the case of blacks or of Hispanics.

In table 3.5, SES levels are presented by academic ability levels. In all three delivery systems, the data indicate a direct relationship between SES and academic ability: students in the lowest SES quartile have the highest proportion in the low academic ability category. Furthermore, these data indicate that a higher proportion of low SES students are enrolled in vocational high schools than in either comprehensive high schools or area vocational centers.

Vocational Curriculum Patterns

Concentrators, Limited concentrators, and Concentrator/Explorers are curriculum patterns defined by Campbell, Orth, and Seitz (1981). These patterns indicate the intensity of participation in vocational education. Students who attend the three types of delivery systems are either categorized into one of three patterns or, because of missing or invalid transcripts, are classified by self-report as vocational students.

Race/Ethnicity and Gender

Regardless of race/ethnicity and gender (table 3.6), more students in vocational high schools report themselves as vocational than can be classified into a curriculum pattern based on transcripts. It appears that many students in vocational high schools perceive themselves to be vocational majors even when their course work does not verify that perception. Furthermore, the proportion of students who are self-report vocational is generally much higher in vocational high schools than in comprehensive high schools and area vocational centers (tables 3.7 and 3.8). Nevertheless, even in comprehensive high schools and area vocational centers, and regardless of race/ethnicity and gender, the proportion of self-report vocational is high--over one-third in 9 of the 13 cells in which sample size is large enough for a reliable estimate. In each type of delivery system, a higher proportion of whites than the other race/ethnicity and gender groups are self-report vocational.

There are only slight differences in the curriculum patterns--Concentrator, Limited Concentrator, and Concentrator/Explorers--among the three delivery systems and the race/ethnicity and gender groups. All students in vocational high

TABLE 3.5

SOCIOECONOMIC STATUS BY ACADEMIC ABILITY
FOR EACH TYPE OF DELIVERY SYSTEM

	Vocational						Comprehensive						Area Vocational					
		Academic Ability						Academic Ability						Academic Ability				
SES	Total n and %	Low	2nd	3rd	High	Missing	Total n and %	Low	2nd	3rd	High	Missing	Total n and %	Low	2nd	3rd	High	Missing
Low	155						791						176					
	35.06	37.65	39.83	18.03	2.03	2.47	27.71	35.89	33.18	22.51	7.02	1.41	29.39	32.43	33.34	20.89	9.78	3.56
2nd	144						692						172					
	28.87	32.73	32.30	24.99	9.67	0.31	27.07	20.37	28.91	29.91	20.00	0.81	29.14	20.34	31.00	31.42	16.17	1.07
3rd	92						700						133					
	20.61	26.24	31.30	23.54	17.89	1.03	26.06	15.09	26.16	30.82	26.41	1.52	23.13	14.06	29.72	29.52	23.10	3.59
High	46						459						105					
	12.16	9.10	32.61	31.96	16.39	9.94	17.86	11.44	26.86	31.64	27.84	2.22	16.84	11.57	19.34	30.94	36.60	1.56
Missing	32						66						15					
	3.30	52.87	22.94	15.51	0.00	8.68	1.30	58.16	18.31	14.31	5.91	3.31	1.50	24.66	48.69	12.06	14.59	0.00*
Total	469	142	160	96	50	21	2708	619	793	730	525	41	601	136	177	154	118	16
	100.00	30.90	34.46	22.79	9.18	2.66	100.00	22.19	28.87	28.20	19.29	1.44	100.00	21.03	29.69	27.52	19.31	2.45

NOTES: *Weighted percentage was not calculated, as weights were missing. Percentages are weighted; numbers are unweighted.

TABLE 3.6

RACE/ETHNICITY AND GENDER BY CURRICULUM PATTERN
FOR VOCATIONAL HIGH SCHOOLS

Race/Ethnicity and Gender	Total n and %	Concentrator	Limited Concentrator	Concentrator/ Explorer	Self-report Vocational
White					
Male	146				
	42.10	17.78	7.11	4.84	70.28
Female	65				
	19.31	17.80	4.60	7.19	70.40
Black					
Male	52				
	14.74	29.39	9.05	9.01	52.54
Female	51				
	12.13	30.67	6.41	5.49	57.44
Hispanic					
Male	28				
	6.03	37.35	18.59	1.12	42.94
Female	13				
	3.21	22.72	14.59	0.00	62.69
Other					
Male	7				
	2.06	2.33	42.67	0.00	55.00
Female	2				
	0.42	100.00	0.00	0.00	0.00
Total	364	95	29	17	223
n and %	100.00	22.42	8.46	5.49	63.63

NOTE: Percentages are weighted; numbers are unweighted.

TABLE 3.7

RACE/ETHNICITY AND GENDER BY CURRICULUM PATTERN
FOR COMPREHENSIVE HIGH SCHOOLS

Race/Ethnicity and Gender	Total n and %	Concentrator	Limited Concentrator	Concentrator/ Explorer	Self-report Vocational
White					
Male	885				
	34.65	12.55	17.90	12.63	56.92
Female	980				
	38.79	15.57	15.34	14.82	54.27
Black					
Male	131				
	4.36	7.33	31.20	13.21	48.27
Female	181				
	5.97	20.47	25.19	15.97	38.38
Hispanic					
Male	249				
	7.07	16.79	30.94	18.36	33.92
Female	206				
	5.78	17.62	25.12	16.85	40.41
Other					
Male	42				
	2.17	46.52	21.46	17.07	14.95
Female	34				
	1.21	16.12	31.76	35.02	17.10
Total	2708	396	564	380	1368
n and %	100.00	15.34	19.50	14.72	50.44

NOTE: Percentages are weighted; numbers are unweighted.

TABLE 3.8

RACE/ETHNICITY AND GENDER BY CURRICULUM PATTERN
FOR AREA VOCATIONAL CENTERS

Race/Ethnicity and Gender	Total n and %	Concentrator	Limited Concentrator	Concentrator/ Explorer	Self-report Vocational
White					
Male	283				
	49.33	9.23	24.08	11.33	55.36
Female	157				
	26.67	13.20	19.32	17.02	50.47
Black					
Male	33				
	6.07	14.12	19.24	42.51	24.13
Female	19				
	3.96	16.05	34.12	26.43	23.40
Hispanic					
Male	53				
	7.35	24.73	30.82	8.80	35.65
Female	35				
	4.21	18.28	45.86	15.45	20.41
Other					
Male	14				
	1.89	14.71	24.31	28.65	32.33
Female	7				
	0.53	8.31	24.18	54.40	13.10
Total	601	77	152	90	282
n and %	100.00	12.47	24.33	15.88	47.32

NOTE: Percentages are weighted; numbers are unweighted.

schools, regardless of race and gender, are more likely to be Concentrators than Limited Concentrators or Concentrator/Explorers, whereas in comprehensive high schools and area vocational centers, with rare exceptions students are more likely to be Limited Concentrators.

Socioeconomic Status

Table 3.9 shows the incidence of curriculum pattern according to SES among students in the three vocational delivery systems. Across all SES levels, the vocational high schools have higher proportions of Concentrators than the other two types of delivery systems. However, the differences are most pronounced as one moves up the SES scale. Putting this another way, in the vocational schools the proportion of Concentrators is virtually invariant to changes in SES; in the comprehensive high schools, on the other hand, the proportion of Concentrators drops sharply as SES rises.

Handicapped Status

Table 3.10 cross-classifies curriculum pattern by handicap status for each of the three delivery systems, and like all students in general, handicapped students in vocational high schools are more likely to be Concentrators than in other curriculum patterns. However, the differences among delivery systems are not as great for handicapped as for nonhandicapped vocational students.

Vocational Specialty Patterns

Students can potentially specialize in six different areas in vocational education: Agriculture, Distributive Education, Occupational Home Economics, Health Occupations, Trade and Industry, and Business. When students specialize, they take at least 60 percent of their vocational credits in one particular specialty area.

Tables 3.11, 3.12, and 3.13 show that most students in the three delivery systems specialize in either Trade and Industry or Business. In vocational high schools and area vocational centers, the majority of students are in Trade and Industry (78 percent and 63 percent, respectively). In comprehensive schools, the majority of students are in Business (56 percent). These results are due, primarily, to the predominance of males among vocational students in vocational high schools and area vocational centers and the predominance of females among vocational students in comprehensive high schools.

TABLE 3.9

SOCIOECONOMIC STATUS BY CURRICULUM PATTERN
FOR EACH TYPE OF DELIVERY SYSTEM

SES	Total	Concentrator	Limited Concentrator	Concentrator/ Explorer	Self-report Vocational
Vocational					
Low	125 34.88	22.52	6.76	4.32	66.40
2nd	123 31.33	22.48	8.73	4.63	64.16
3rd	75 19.61	21.91	6.28	5.25	66.56
High	32 9.77	25.28	21.86	1.91	50.95
Missing	9 4.41	17.17	0.00	29.83	53.00
Total n and %	364 100.00	95 22.42	29 8.46	17 5.49	223 63.63
Comprehensive					
Low	791 27.39	21.99	20.34	12.57	45.10
2nd	692 26.76	15.93	17.55	16.71	49.80
3rd	700 25.76	11.51	18.86	13.49	56.13
High	459 17.66	7.34	21.72	16.31	54.63
Missing	66 2.42	32.67	22.24	18.40	26.69
Total n and %	2708 100.00	396 15.34	564 19.50	380 14.72	1368 50.44
Area Vocational					
Low	176 29.20	14.65	27.95	21.40	35.97
2nd	172 28.95	11.04	17.64	17.23	54.09
3rd	133 22.98	11.42	26.16	13.01	49.41
High	105 16.73	11.67	24.53	9.72	54.08
Missing	15 2.13	19.30	44.39	1.30	35.01
Total n and %	601 100.00	77 12.47	152 24.33	90 15.88	282 47.32

NOTE: Percentages are weighted; numbers are unweighted.

TABLE 3.10

HANDICAPPED STATUS BY CURRICULUM PATTERN
FOR EACH TYPE OF DELIVERY SYSTEM

Handicapped Status	Total	Concentrator	Limited Concentrator	Concentrator/ Explorer	Self-report Vocational
Vocational					
Not handicapped	319 87.04	22.87	9.32	6.05	61.77
Handicapped	45 12.96	19.46	2.70	1.73	76.12
Total	364	95	29	17	223
n and %	100.00	22.42	8.46	5.49	63.63
Comprehensive					
Not handicapped	2410 89.48	15.11	19.36	14.63	50.91
Handicapped	298 10.52	17.34	20.75	15.48	46.43
Total	2708	396	564	380	1368
n and %	100.00	15.34	19.50	14.72	50.44
Area Vocational					
Not handicapped	513 84.01	12.81	21.71	18.50	46.99
Handicapped	88 15.99	10.72	38.10	2.14	49.04
Total	601	77	152	90	282
n and %	100.00	12.47	24.33	15.88	47.32

NOTE: Percentages are weighted; numbers are unweighted.

TABLE 3.11

RACE/ETHNICITY AND GENDER BY SPECIALTY
FOR VOCATIONAL HIGH SCHOOLS

Race/ Ethnicity and Gender	Total n and %	Agriculture	Business	Health	Trade & Industry	Home Economics	Distributive Education
White							
Male	146						
	42.10	3.91	1.64	0.00	92.97	1.48	0.00
Female	65						
	19.31	3.37	29.34	2.75	60.12	1.39	3.03
Black							
Male	52						
	14.74	0.00	2.57	2.72	93.16	0.00	1.54
Female	51						
	12.13	8.06	39.07	6.95	37.43	4.30	4.19
Hispanic							
Male	28						
	6.03	0.00	10.43	0.00	89.57	0.00	0.00
Female	13						
	3.21	0.00	29.21	0.00	51.49	19.30	0.00
Other							
Male	7						
	2.06	0.00	30.45	0.00	69.55	0.00	0.00
Female	2						
	0.42	0.00	0.00	0.00	100.00	0.00	0.00
Total	364	7	58	6	278	8	7
n and %	100.00	3.27	13.67	1.78	77.93	2.03	1.32

NOTE: Percentages are weighted; numbers are unweighted.

TABLE 3.12

RACE/ETHNICITY AND GENDER BY SPECIALTY
FOR COMPREHENSIVE HIGH SCHOOLS

Race/ Ethnicity and Gender	Total n and %	Agriculture	Business	Health	Trade & Industry	Home Economics	Distributive Education
White							
Male	885						
	34.65	8.06	24.36	0.00	65.54	0.79	1.24
Female	980						
	38.79	1.16	88.66	0.76	6.39	1.68	1.35
Black							
Male	131						
	4.36	1.97	31.32	0.00	60.24	1.82	4.65
Female	181						
	5.97	1.02	77.88	3.18	11.66	1.57	4.69
Hispanic							
Male	249						
	7.07	8.38	19.78	0.68	69.39	0.59	1.17
Female	206						
	5.78	2.11	79.39	2.29	9.16	6.22	0.82
Other							
Male	42						
	2.17	1.96	17.49	0.00	80.55	0.00	0.00
Female	34						
	1.21	0.00	78.09	1.89	15.91	0.77	3.34
Total	2708	102	1509	24	985	43	45
n and %	100.00	4.15	56.16	0.69	35.88	1.51	1.61

NOTE: Percentages are weighted; numbers are unweighted.

TABLE 3.13

RACE/ETHNICITY AND GENDER BY SPECIALTY
FOR AREA VOCATIONAL CENTERS

Race/ Ethnicity and Gender	Total n and %	Agriculture	Business	Health	Trade & Industry	Home Economics	Distributive Education
White							
Male	283						
	49.33	2.74	11.13	0.00	85.75	0.00	0.39
Female	157						
	26.67	2.81	72.44	3.64	17.63	1.23	2.25
Black							
Male	33						
	6.07	0.00	7.41	0.00	88.82	0.00	3.77
Female	19						
	3.96	0.00	84.30	4.50	11.20	0.00	0.00
Hispanic							
Male	53						
	7.35	4.75	2.77	0.59	90.49	0.00	1.40
Female	35						
	4.21	1.18	53.66	0.00	32.79	7.78	4.60
Other							
Male	14						
	1.89	0.00	0.00	0.00	100.00	0.00	0.00
Female	7						
	0.53	0.00	29.35	0.00	70.65	0.00	0.00
Total	601	18	187	9	373	5	9
n and %	100.00	2.50	31.21	1.19	63.13	0.66	1.32

NOTE: Percentages are weighted; numbers are unweighted.

Race/Ethnicity and Gender

In each type of delivery system and regardless of race/ethnicity, male students are much more likely to specialize in Trade and Industry than in other specialty areas (tables 3.11, 3.12, and 3.13). For example, 66 percent of white males, 60 percent of black males, and 69 percent of Hispanic males are in Trade and Industry in the comprehensive high schools. The proportions are even higher in vocational high schools and area vocational centers.

The majority of females in comprehensive high schools and area vocational centers are in Business. The proportions are 89 percent of white females, 78 percent of black females, and 79 percent of Hispanic females. In area vocational centers, the percentages are relatively similar except for the substantial enrollment of Hispanic women in Trade and Industry (33 percent). The predominance of the Business specialty does not hold true for females, in vocational high schools, however. In this delivery system, a majority of both white and Hispanic females like their male counterparts, are enrolled in Trade and Industry.

Socioeconomic Status

The SES of students does not appear dramatically to affect specialization in any of the delivery systems (tables 3.14, 3.15, and 3.16). In vocational high schools and area vocational centers, students of all SES levels are more likely to specialize in Trade and Industry than in all other specialty areas combined, and in comprehensive high schools, a majority of students at each SES level tend to follow the Business specialty.

Handicapped Status

Similar to the trend observed for the entire sample of students, handicapped students in vocational high schools and area vocational centers are more likely to be in Trade and Industry than in all other specialty areas (79 percent and 67 percent, respectively). These data are presented in table 3.17. In comprehensive high schools, a higher proportion of handicapped students specialize in Business (48 percent) than in Trade and Industry (41 percent).

TABLE 3.14

SOCIOECONOMIC STATUS BY SPECIALTY
FOR VOCATIONAL HIGH SCHOOLS

SES Quartile	Total n and %	Agriculture	Business	Health	Trade & Industry	Home Economics	Distributive Education
Low	125						
	34.88	2.29	10.03	2.29	81.10	4.12	0.18
2nd	123						
	31.33	3.04	20.77	1.43	72.32	0.00	2.45
3rd	75						
	19.61	3.45	16.03	1.34	75.09	1.58	2.51
High	32						
	9.77	8.68	5.33	2.75	80.31	2.93	0.00
Missing	9						
	4.41	0.00	0.00	0.00	100.00	0.00	0.00
Total	364	7	58	6	278	8	7
n and %	100.00	3.27	13.67	1.78	77.93	2.03	1.32

NOTE: Percentages are weighted; numbers are unweighted.

TABLE 3.15

SOCIOECONOMIC STATUS BY SPECIALTY
FOR COMPREHENSIVE HIGH SCHOOLS

SES Quartile	Total n and %	Agriculture	Business	Health	Trade & Industry	Home Economics	Distributive Education
Low	791						
	27.39	5.25	58.25	0.75	30.67	3.00	2.07
2nd	692						
	26.76	4.46	53.78	0.60	38.27	1.27	1.62
3rd	700						
	25.76	4.34	57.54	0.81	35.71	0.60	0.99
High	459						
	17.66	2.03	57.59	0.43	37.47	1.04	1.44
Missing	66						
	2.42	1.50	33.82	1.47	58.66	0.52	4.02
Total	2708	102	1509	24	985	43	45
n and %	100.00	4.15	56.16	0.69	35.88	1.51	1.61

NOTE: Percentages are weighted; numbers are unweighted.

TABLE 3.16

SOCIOECONOMIC STATUS BY SPECIALTY
FOR AREA VOCATIONAL CENTERS

SES Quartile	Total n and %	Agriculture	Business	Health	Trade & Industry	Home Economics	Distributive Education
Low	176						
	29.20	1.27	30.23	1.30	62.53	1.62	3.05
2nd	172						
	28.95	3.30	27.87	1.77	66.24	0.63	0.18
3rd	133						
	22.98	2.90	38.42	0.63	56.86	0.00	1.18
High	105						
	16.73	1.78	32.78	0.92	63.92	0.00	0.60
Missing	15						
	2.13	9.79	0.00	0.00	90.21	0.00	0.00
Total	601	18	187	9	373	5	9
n and %	100.00	2.50	31.21	1.19	63.13	0.66	1.32

NOTE: Percentages are weighted; numbers are unweighted.

TABLE 3.17

HANDICAPPED STATUS BY SPECIALTY
FOR EACH TYPE OF DELIVERY SYSTEM

	Total n and %	Agriculture	Business	Health	Trade & Industry	Home Economics	Distributive Education
Vocational							
Not handicapped	319 87.04	3.41	13.94	1.59	77.82	1.74	1.52
Handicapped	45 12.96	2.40	11.87	3.05	78.65	4.02	0.00
Total n and %	364 100.00	7 3.27	58 13.67	6 1.78	278 77.93	8 2.03	7 1.32
Comprehensive							
Not handicapped	2410 89.48	3.85	57.16	0.61	35.28	1.35	1.76
Handicapped	298 10.52	6.71	47.67	.37	41.00	2.91	0.34
Total n and %	2708 100.00	102 4.15	1509 56.16	24 0.69	985 35.88	43 1.51	45 1.61
Area Vocational							
Not handicapped	513 84.01	2.33	32.62	1.05	62.39	0.23	1.38
Handicapped	88 15.99	3.39	23.79	1.96	66.99	2.92	0.96
Total n and %	601 100.00	18 2.50	187 31.21	9 1.19	373 63.13	5 0.66	9 1.32

Note: Percentages are weighted; numbers are unweighted.

Multivariate Analyses

In order to explore the issue of whether the several vocational education delivery systems make different contributions to the ultimate labor market success of their graduates, multiple linear regression analysis has been used, employing the model described in chapter 2. Regressions have been run not only for all members of the sample who were working part-time or full-time but also for five separate strata--males, females, persons of low SES, Trade and Industry majors, and Business majors. Each regression has been run with two different dependent variables--the logarithm of hourly rate of pay and the logarithm of monthly earnings. In the regression for the total sample, hierarchical analysis has been used (Cohen and Cohen 1983, pp. 137-139) in order to ascertain what proportion of the total explained variance in the dependent variable can be accounted for sequentially by (1) the control variables, (2) the special population subgroups, (3) the curriculum patterns, (4) the area of specialization, and (5) the type of delivery system.

The Total Sample

The results of the hierarchical analysis are presented in tables 3.18 and 3.19 with hourly wages and monthly earnings as the dependent variables. The top portion of table 3.18 shows that each set of variables is statistically significant when entered into the regression alone. Independently, no set explains more than the 7 percent of the variance in the dependent variable that is explained by the control variables. The special population variables account for about 5 percent of the variance in hourly wages compared to the 4 percent explained by curriculum pattern, 2 percent by specialties, and less than 1 percent by delivery system.

The bottom portion of the table shows what happens to the R^2 as each set of variables is added in turn to the control variables. Consulting the F values, one notes that only two sets of variables explain a statistically significant portion of variance in hourly wages over and above the control variables. These are the special population variables and the curriculum pattern variables. Beyond these sets of variables, the vocational specialties and the form of delivery system make no significant contribution to explaining variation in hourly wages.

More specifically, when the set of variables identifying the special subgroups of the population is added to the regression equation along with the control variables, the R^2 rises

TABLE 3.18

EFFECTS OF SETS OF VARIABLES ON
HOURLY WAGES FOR ALL WORKERS

(n = 1210)

Variable Sets	R^2	R^2 Increment	F
Controls	0.071	0	5.84*
Special populations	0.048	0	3.76*
Curriculum patterns	0.040	0	8.35*
Specialties	0.023	0	14.21*
Delivery systems	0.005	0	2.73*
Controls and special populations	0.106	0.035	2.88*
Controls, special populations, and curriculum patterns	0.132	0.026	5.84*
Controls, special populations, curriculum patterns, and specialties	0.136	0.004	2.70
Controls, special populations, curriculum patterns, specialties, and delivery systems	0.139	0.003	2.69

*Indicates that the chance probability of an effect this large is $\leq$ 0.05.

TABLE 3.19

EFFECTS OF SETS OF VARIABLES ON
MONTHLY EARNINGS FOR ALL WORKERS

(n = 1210)

Variable Sets	R^2	R^2 Increment	F
Controls	0.165	0	13.01*
Special populations	0.077	0	6.22*
Curriculum patterns	0.042	0	8.79*
Specialties	0.062	0	39.67*
Delivery systems	0.008	0	4.87*
Controls and special populations	0.220	0.055	4.27*
Controls, special populations, and curriculum patterns	0.237	0.017	3.37*
Controls, special populations, curriculum patterns, and specialties	0.241	0.004	2.34
Controls, special populations, curriculum patterns, specialties, and delivery systems	0.243	0.002	1.17

*Indicates that the chance probability of an effect this large is $\leq$ 0.05.

from 0.07 to 0.11. Addition of the curriculum pattern variables causes the R^2 to rise to 0.13. However, when the variables identifying vocational specialties and delivery systems are added, R^2 rises--less than 1 percentage point--to just under 14 percent of the variance in hourly wages.

The monthly earnings equations yield very similar results (table 3.19). The independent contribution of each set of variables to the explanation of variation in monthly earnings is statistically significant and is greatest for the control variables and least for delivery systems.

The contribution of special populations to variation in monthly earnings, once control variables are entered into the model, is statistically significant. These two sets of variables account for about 22 percent of the variance in monthly earnings. The addition of vocational education is also significant, raising the R^2 by 2 percentage points, whereas the addition of specialties and delivery systems is not. In comparison to the equation for hourly wages, the equation explains more of the variance in monthly earnings--over 24 percent, as compared with 13 percent in the hourly wage equation.

To gain a better understanding of the determinants of labor market success, it is instructive to examine the parameter estimates of each of the individual variables at the final stage of the hierarchical regression analysis (table 3.20). Among the control variables, SES bears the expected strong negative relationship to earnings. In regard to special subgroups of the population, females suffer a distinct disadvantage relative to white males. The disparity is especially pronounced in the case of white women and those of "other races". For black women, the negative coefficient is statistically significant in the case of monthly, but not hourly, earnings. It is of considerable interest that membership in a minority race or ethnic group (black or Hispanic) does not impose the same wage penalty as that inflicted upon women (as compared to white men).

Having enrolled fairly intensively in vocational education--i.e., being in the Limited Concentrator group--is associated with a significant monthly earnings advantage relative to the Concentrator/Explorers and self-report vocational graduates. The hourly wage and monthly earnings advantages are even greater for vocational education graduates who are working in training-related jobs. So far as specialties within vocational education are concerned, having been a Business specialist brings an earnings disadvantage relative to the combined group of students from the Agriculture, Health Occupations, Occupational Home Economics, and Distributive Education specialties.

TABLE 3.20

EFFECTS OF DELIVERY SYSTEMS ON HOURLY WAGES AND MONTHLY EARNINGS FOR ALL WORKERS
(n = 1210)

	Hourly		Monthly	
	Parameter Estimates	t-value	Parameter Estimates	t-value
Intercept	1.4252	15.04*	6.5690	47.76*
Control Variable				
Academic ability	0.0006	0.41	-0.0007	-0.34
Self-esteem	0.0156	1.01	0.0263	-1.17
Region				
Northeast	0.1131	3.27*	0.1348	2.67*
South	0.0785	2.60*	0.0566	1.28
West	0.0961	2.67*	0.0698	1.33
Socioeconomic status	0.0733	3.60*	0.0795	2.67*
Suburban/rural	-0.0114	-0.52	0.0093	0.29
Postsecondary ed.				
Currently enrolled	-0.1064	-3.29*	-0.3719	-7.87*
Completed less than 1 year	0.0661	1.92	0.0764	1.52
Completed 1 year	0.0358	0.89	-0.0248	-0.42
Completed 2 years	-0.1055	-1.15	-0.2337	-1.82
Indeterminant	0.0295	0.89	-0.0286	-0.59
Labor market experience	0.0014	4.07*	0.0019	4.00*
Special Populations				
Hispanic male with limited English proficiency	-0.2329	-1.21	-0.2723	-0.97
Hispanic female with limited English proficiency	-0.1950	-1.03	-0.3994	-1.44
Black male	-0.0242	-0.47	-0.0188	-0.25
Other male	-0.0616	-0.84	-0.0464	-0.43
Black female	0.1015	-1.73	-0.1809	-2.11*
White female	-0.1089	-3.52*	-0.2011	-4.45*
Other female	-0.2655	-3.14*	-0.3156	-2.55*
Female low SES	-0.0023	-0.06	-0.0420	-0.71
Hispanic low SES	0.0834	1.29	0.0829	0.89
Black low SES	0.0202	0.32	-0.0549	-0.59
Other low SES	0.0542	0.52	-0.0094	-0.06
Handicapped	-0.0402	-1.21	-0.0365	-0.75

*Indicates that the chance probability of an effect this large is ≤ 0.05.
TR means training-related placement.

TABLE 3.20--Continued

	Hourly		Monthly	
	Parameter Estimates	t-value	Parameter Estimates	t-value
Educational Experience				
Concentrator	0.0259	0.86	0.0678	1.54
Limited Concentrator	0.1392	0.32	0.1897	2.91*
Self-report vocational (TR)	0.2729	4.48*	0.2979	3.34*
Business specialty	-0.0881	-2.19*	-0.1316	-2.24*
Trade and industry specialty	-0.0757	-1.84	-0.0559	-0.93
Delivery System				
Vocational high school	0.0123	0.31	0.0118	0.20
Area vocational center	-0.0641	-2.17*	-0.0701	-1.62
	R^2 = 0.139		R^2 = 0.243	
	Adj. R^2 = 0.107		Adj. R^2 = 0.215	
	F-Ratio = 4.283		F-Ratio = 8.501	

Finally, with respect to delivery systems, enrollment in an area vocational center brings a wage disadvantage relative to the vocational programs in a comprehensive high school. The coefficient for the area vocational center is negative in the case of both hourly and monthly earnings, although it falls somewhat short of being statistically significant in the latter case. This finding is highly interesting and unexpected. It needs to be interpreted with considerable caution, however, because of ambiguities in the data. It will be recalled that close to 7,000 sample cases were lost as the result of the impossibility of assigning them definitively to either comprehensive high schools or area vocational centers. If the relationship is indeed real, one may speculate that the disadvantage of the area vocational center may stem from the time involved in travel between the home school and the center.

Men versus Women

As has been noted, separate multiple linear regressions were implemented for males and females (table 3.21). The variable in the model account for a greater proportion of variance in hourly wages and monthly earnings for males than for females. To illustrate, the R^2 for the monthly earnings equations is 0.17 for females and 0.26 for males.

The control variables display roughly the same pattern for both men and women as they do for the total sample. None of the race or ethnicity variables bears a statistically significant relationship to earnings. The variable for handicapped status is also nonsignificant, although the negative coefficient is sufficiently regular as to suggest that a larger sample would show a statistically significant wage penalty for the handicapped.

Curriculum patterns bear a statistically significant relationship to earnings for men but not for women. Men who have training-related jobs and are Limited Concentrators, Concentrator/Explorers, or self-report vocational earn more per hour and per month than other male vocational education graduates. However, when male Concentrators or Limited Concentrators are not in training-related jobs, they experience a slight (nonsignificant) wage penalty.

Finally, the relationship between delivery system and earnings that has been described for the total sample exists in the case of men but not of women. For the women, the coefficient for the area vocational centers is positive in the case of hourly wages and negative in the case of monthly earnings, but in neither case is it significantly different from zero.

TABLE 3.21

EFFECTS OF DELIVERY SYSTEMS ON HOURLY WAGES AND MONTHLY EARNINGS FOR MALES AND FEMALES

	Males (n = 626)				Females (n = 584)			
	Hourly		Monthly		Hourly		Monthly	
	Parameter Estimate	t-value	Parameter Estimate	t-value	Parameter Estimate	t-value	Parameter Estimate	t-value
Intercept	1.5500	11.64*	6.8909	38.17*	1.1939	9.12*	5.9794	29.05*
Control Variables								
Academic ability	-0.0009	-0.45	-0.0052	-1.87	0.0022	1.04	0.0050	1.47
Self-esteem	-0.0230	-1.01	0.0193	0.63	0.0502	2.39*	0.0233	0.71
Region								
Northeast	0.1369	2.72*	0.1333	1.96*	0.0999	2.13*	0.1502	2.04*
South	0.1246	2.89*	0.1147	1.97*	0.0327	0.78	-0.0049	-0.08
West	0.1021	1.98*	0.0781	1.12	0.0931	1.86	0.0780	0.99
Socioeconomic status	0.0711	2.95*	0.0780	2.39*	0.0670	2.78*	0.1200	2.90*
Suburban/rural	0.0115	0.37	0.0311	0.74	-0.0672	-2.17*	-0.0400	-0.82
Postsecondary ed.								
Currently enrolled	-0.0760	-1.82	-0.3364	-5.93*	-0.1017	-2.58*	-0.4295	-6.92*
Completed 1 year	0.0208	0.45	0.0144	0.23	0.0130	0.31	-0.0285	-0.43
Labor market experience	0.0015	3.22*	0.0020	3.10*	0.0012	2.46*	0.0018	2.48*
Special Populations								
Black male	0.0023	0.05	-0.0361	-0.52	--	--	--	--
Black female	--	--	--	--	-0.0046	-0.10	0.0206	0.27
Hispanic male	0.0104	0.21	0.0033	0.05	--	--	--	--
Hispanic female	--	--	--	--	0.0566	1.13	0.0992	1.26
Other male	-0.0413	-0.59	-0.0401	-0.42	--	--	--	--
Other female	--	--	--	--	-0.1066	-1.45	-0.0437	-0.38
Handicapped	-0.0716	-1.56	-0.0403	-0.65	0.0018	0.04	-0.0255	-0.34

*Indicates that the chance probability of an effect this large is ≤ 0.05.

TR means training-related placement.

TABLE 3.21--Continued

	Males (n = 595)				Females (n = 584)			
	Hourly		Monthly		Hourly		Monthly	
	Parameter Estimate	t-value	Parameter Estimate	t-value	Parameter Estimate	t-value	Parameter Estimate	t-value
Educational Experiences								
Concentrator	-0.0520	-1.11	-0.0133	-0.21	0.0685	1.73	0.0862	1.38
Limited Concentrator	-0.0249	-0.63	-0.0568	-1.06	0.0456	1.23	0.0258	0.44
Concentrator (TR)	0.1011	1.75	0.0580	0.74	0.0760	1.17	0.0924	0.90
Limited Concentrator (TR)	0.1593	2.66*	0.2336	2.88*	0.1138	1.67	0.1355	1.26
Concentrator/Explorer (TR)	0.0655	0.94	0.2146	2.27*	0.0903	0.90	-0.2088	1.32
Self-report vocational (TR)	0.2935	3.93*	0.2942	2.91*	0.1293	1.19	0.1791	1.05
Business specialty	-0.2010	-3.21*	-0.3506	-4.14*	0.0112	0.21	0.0320	0.37
Trade & Industry specialty	-0.1198	-2.11*	-0.1465	-1.90	-0.0527	-0.81	-0.0139	-0.14
Delivery System								
Vocational high school	-0.0283	-0.55	0.0005	0.01	0.0911	1.44	0.1066	1.08
Area vocational centers	-0.1065	-2.75*	-0.0948	-1.81	0.0156	0.34	-0.0141	-0.19
	R^2= 0.152		R^2= 0.257		R^2= 0.107		R^2= 0.171	
	Adj. R^2= 0.111		Adj. R^2= 0.220		Adj. R^2= 0.060		Adj. R^2= 0.128	
	F-Ratio = 3.690		F-Ratio = 7.091		F-Ratio = 2.293		F-Ratio = 3.941	

Students of Low Socioeconomic Status

Table 3.22 presents the regression results for members of the sample who, as students, were in the lowest quartile of the socioeconomic status distribution. One gets the impression from these results that education is not very effective in counteracting the pervasive influence of low socioeconomic status, perhaps because there is not sufficient variety in education for the low SES group. In any case, the significant explanatory variables tend to be the control variables and special group membership rather than educational influences.

As in the case of the total sample, being a woman is associated with an earnings disadvantage that is statistically significant in the case of monthly earnings and nearly so in the case of hourly wages.

The parameter estimates of all of the education variables are positive, but only one is sufficiently large to be considered a reliable population estimate. Specifically, those who report a vocational curriculum and are in training-related jobs have significantly higher hourly wages. Because the documented course work in vocational education and the identified specialties do not show significant effects, the possibility arises that the self-report statement may be as much an attitude toward working as an outcome of curriculum. This speculation cannot, however, be evaluated with the data at hand.

For low SES respondents, there is no evidence of statistically significant relationships between delivery system and earnings, but the coefficients for the area vocational schools are negative in both equations and narrowly miss achieving statistical significance in the case of hourly wages.

Vocational Specialties

Table 3.23 presents the results of fitting the basic model to the two most populous specialty groups--Business and Trade and Industry. As in virtually all the regressions, the control variables account for much of the variability in wages and earnings in the case of both specialties. However, the remaining results differ between the two groups. Among those who follow the Business specialty, there are no significant differences between white women and any other population group in hourly wages or monthly earnings. In contrast, women who follow the Trade and Industry specialty are sharply less well-off than white men. Other men do not differ significantly from the white men, although they appear to experience a small, consistent earnings disadvantage.

TABLE 3.22

EFFECTS OF DELIVERY SYSTEMS ON HOURLY WAGES AND MONTHLY EARNINGS FOR LOW SES GRADUATES

(n = 349)

	Hourly		Monthly	
	Parameter Estimate	t-value	Parameter Estimate	t-value
Intercept	1.3164	8.38*	6.3313	26.96*
Control Variables				
Academic ability	-0.0021	-0.79	-0.0036	-0.93
Region	0.1829	2.96*	0.2326	2.52*
Northeast	0.0578	1.17	0.0258	0.35
South	0.1444	2.14	0.1436	1.42
West				
Suburban/rural	0.0300	0.75	0.0258	0.43
Postsecondary ed.				
Currently enrolled	-0.0761	-1.31	-0.3445	-3.96*
Completed 1 year	-0.0959	-1.30	0.1922	-1.74
Labor market experience	0.0021	3.49*	0.0035	3.95*
Special Populations				
Female	-0.0863	-1.75	-0.1691	-2.29*
Hispanic	0.0516	0.10	0.0589	0.76
Black	0.0387	0.72	0.0201	0.25
Handicapped	-0.0227	-0.41	-0.1140	1.38
Educational Experience				
Concentrator	0.0414	0.77	0.0184	0.23
Limited Concentrator	0.0336	0.63	0.0263	0.33
Self-report vocational (TR)	0.1123	2.11*	0.0982	1.24
Business specialty	0.0036	0.05	0.0067	0.06
Trade & industry specialty	0.0325	0.43	0.1491	1.33
Delivery System				
Vocational high school	0.0265	0.38	0.0736	0.70
Area vocational centers	-0.0988	-1.82	-0.1109	-1.37
	R^2 = 0.173		R^2 = 0.285	
	Adj. R^2 = 0.117		Adj. R^2 = 0.237	
	F-Ratio = 3.094		F-Ratio = 5.917	

*Indicates that the chance probability of an effect this large is $\leq$ 0.05.
TR means training-related placement.

TABLE 3.23

EFFECTS OF DELIVERY SYSTEMS ON HOURLY WAGES AND MONTHLY EARNINGS FOR BUSINESS AND TRADE AND INDUSTRY MAJORS

	Business (n = 595)				Trade and Industry (n = 516)			
	Hourly		Monthly		Hourly		Monthly	
	Parameter Estimate	t-value	Parameter Estimate	t-value	Parameter Estimate	t-value	Parameter Estimate	t-value
Intercept	1.2064	10.02*	6.0882	30.87*	1.4532	11.17*	6.7559	41.60*
Control Variables								
Academic ability	0.0008	0.40	0.0019	0.55	0.0002	0.09	-0.0041	-1.53
Region								
Northeast	0.1204	2.59*	0.1656	2.17*	0.1175	2.11*	0.1752	2.52*
South	0.0736	1.82	0.0650	0.98	0.0501	0.99	0.0375	0.59
West	0.1070	2.20*	0.1051	1.32	0.0571	1.00	0.0911	1.27
Socioeconomic status	0.0655	2.79*	0.0991	2.57*	0.0555	2.12*	0.0500	1.53
Suburban/rural	-0.0405	-1.34	-0.0146	-0.29	-0.0033	-0.10	-0.0077	-0.18
Postsecondary ed.								
Currently enrolled	-0.0838	-2.16*	-0.3990	-6.27*	-0.0580	-1.26	-0.3278	-5.72*
Completed 1 year	-0.0064	-0.16	-0.0420	-0.63	0.0050	0.10	0.0129	0.20
Labor market experience	0.0012	2.50*	0.0020	2.64	0.0015	2.89*	0.0021	3.24*
Special Populations								
Male	0.0513	1.40	0.0836	1.39	--	--	--	--
Female	--	--	--	--	-0.1670	-3.47*	-0.3290	-5.48*
Black male	--	--	--	--	-0.0239	-0.40	-0.0108	-0.15
Black female	0.0150	0.28	-0.0101	-0.12	--	--	--	--
Hispanic male	--	--	--	--	-0.0103	-0.20	-0.0353	-0.54
Hispanic female	0.0930	1.68	0.0404	0.45	--	--	--	--
Handicapped	0.0136	0.27	0.0523	0.64	-0.0570	-1.20	-0.0980	-1.66

*Indicates that the chance probability of an effect this large is ≤ 0.05. TR means training-related placement.

TABLE 3.23--Continued

	Business (n = 595)				Trade and Industry (n = 516)			
	Hourly		Monthly		Hourly		Monthly	
	Parameter Estimate	t-value	Parameter Estimate	t-value	Parameter Estimate	t-value	Parameter Estimate	t-value
Educational Experiences								
Concentrator	0.0886	2.18*	0.1090	1.64	-0.0907	-1.83	-0.0787	-1.27
Limited Concentrator	0.0573	1.60	0.0352	0.60	-0.0504	-1.09	-0.1155	-2.00*
Self-report vocational (TR)	0.1062	2.22*	0.0283	0.36	0.1354	3.19*	0.1889	3.56*
Delivery System								
Vocational high school	0.0939	1.25	0.1491	1.22	-0.0432	-0.86	-0.0617	-0.98
Area vocational centers	0.0750	1.53	0.0520	0.65	-0.1481	-3.83*	-0.1215	-2.52*
	R^2 = 0.089		R^2 = 0.145		R^2 = 0.173		R^2 = 0.299	
	Adj. R^2 = 0.054		Adj. R^2 = 0.112		Adj. R^2 = 0.136		Adj. R^2 = 0.268	
	F-Ratio = 2.542		F-Ratio = 4.412		F-Ratio = 4.694		F-Ratio = 9.556	

In the Business specialty, the Concentrators and the self-reported vocational students in training-related jobs earn higher hourly wages than do groups with less concentration. In the Trade and Industry specialty, self-reported vocational students in training-related jobs also enjoy significant wage and earnings advantages. Finally, when one examines the delivery systems, no effect is observed for participants in the Business specialty, but significant negative effects emerge for the area vocational centers among those trained in Trade and Industry.

CHAPTER 4

SUMMARY AND CONCLUSIONS

This study has responded to two of the research mandates of the Carl D. Perkins Vocational Education Act of 1984: (1) to evaluate the relative effectiveness of alternative delivery systems for secondary vocational education and (2) to ascertain how well vocational education in high schools is serving selected subsets of the population: women, minority groups, the handicapped, the economically disadvantaged, and persons with limited English proficiency. In linking these two research objectives, the study has sought to ascertain whether vocational high schools, comprehensive high schools, and area vocational centers differ with respect to the characteristics of their vocational education graduates and/or in the contribution they make to economic success once these graduates enter the labor market.

More specifically, the study has sought answers to the following four questions:

- Are there differences among vocational high schools, comprehensive high schools, and area vocational centers in the demographic mix of their vocational graduates, including the proportions of economically disadvantaged, the handicapped, and those with limited English proficiency (LEP)?

- Do the graduates from these three different types of institutes differ according to their vocational specialties and their curriculum patterns--i.e., the intensity of their participation in vocational programs?

- Controlling for the characteristics of the students and of the environment, do the three types of delivery systems differ in their contributions to ultimate labor market success, as measured by students' postgraduation hourly and monthly earnings?

- Do the relative labor market outcomes of the three delivery systems differ according to (1) gender, (2) socioeconomic status, or (3) vocational specialty?

To explore these issues, a National sample of about 3,700 public high school graduates from vocational programs was drawn from the High School and Beyond (HS&B) database, representing about 12 percent of the original 1980 HS&B sample of

high school sophomores. The vast majority of high school sophomores from the HS&B sample were excluded because they attended private schools, because they failed to graduate, or because they did not pursue a vocational curriculum. However, a sizeable number (about 7,000) were excluded because of the impossibility of ascertaining whether their vocational program was taken in a comprehensive high school or an area vocational center.

The first two research questions, relating to the characteristics and the curricula of students in the three types of vocational programs, have been addressed by means of extensive cross-tabulations. The second two questions, relating to whether any of the three delivery systems tends to create an earnings advantage for its graduates, have been approached through multiple regression analysis of hourly and monthly earnings. In addition to type of delivery system, the explanatory variables in this regression have included (1) a set of control variables relating to student characteristics and characteristics of the environment, (2) pattern and intensity of participation in vocational education (based on analyses of student transcripts), and (3) area of vocational specialization. The basic regression has been run for the total sample as well as for males and females separately, for economically disadvantaged persons (lowest SES quartile), and separately for majors in Trade and Industry and Business. In each of these, Hispanics, blacks, and other races have been differentiated from non-Hispanic whites, and the handicapped have been differentiated from those without handicaps.

Principal Findings

The findings of the study have been reported in considerable detail in chapter 3. It is useful at this point to summarize the more important generalizations that these findings appear to warrant, without repeating the supporting evidence.

- There are a few rather pronounced differences in the clientele of the three delivery systems, especially between the vocational schools on the one hand and the comprehensive schools and area vocational centers on the other. Specifically:

  -- Males are relatively more numerous in the vocational schools and the area vocational centers than among the vocational majors in comprehensive high schools. White males are disproportionately represented in the area vocational centers.

-- Vocational schools enroll relatively more blacks than the other two types of institutions; this is true of men and women alike.

-- The vocational schools have larger proportions of low SES students, but this is exclusively the result of their higher proportion of blacks; within the black population, there is no systematic difference in SES between vocational schools and the other two types.

-- Vocational schools enroll larger proportions of low-ability students than do the comprehensive schools and the area vocational centers. This is primarily attributable to whites; the relationship does not prevail among blacks. The relationship between ability and type of institution is largely independent of SES.

o There is also a relationship between type of institution and both curriculum patterns and area of specialization.

-- Students in vocational schools are considerably more likely to have more intensive work in vocational courses than are students in the other types of programs. That is, larger proportions of them are Concentrators.

-- The Trade and Industry specialty is the most popular in the vocational schools (78 percent) and the area vocational centers (56 percent), whereas the Business specialty attracts the largest number of students in the comprehensive schools (56 percent). Even though women vocational students as a whole are far more likely to be found in Business than in Trade and Industry, those in vocational high schools more frequently elect the Trade and Industry specialty.

o There are few if any systematic relationships between English language proficiency or handicap status and type of vocational education delivery system.

o As far as determinants of postgraduation hourly and monthly earnings are concerned, no sets of variables explain as much of the variation in earnings as do the control variables--for example, SES, region, or postsecondary education enrollment.

- As compared with the comprehensive high school, area vocational centers generally show a negative effect on earnings when other factors are controlled, and this achieves statistical significance for at least one of the earnings measures in four of the six regressions that have been run. The coefficient for the vocational high school, on the other hand, is generally positive but never statistically significant. This finding needs to be interpreted cautiously because of the relatively large number of cases in which it could not be ascertained whether students were attending an area vocational center.

Interpretation and Policy Considerations

Because this has been an initial exploration of hitherto unexplored terrain, and because the principal explanatory variable (type of delivery system) contains an ambiguity resulting from deficiencies in the data, the findings must be interpreted cautiously. Nevertheless, they do provide a basis for at least questioning the rather glib assertions, based apparently largely on anecdotal evidence, of the superiority of area vocational centers as a means of providing secondary school vocational training (Committee for Economic Development 1985, pp. 33-34). If one judges on the basis of earnings of graduates soon after they enter the labor market, the evidence here is that the area vocational centers do no better than or even as well as the comprehensive high schools. Certainly until there is further research, policy ought not to assume that the older systems of providing secondary vocational education have been discredited. Improvement in the delivery of vocational education should probably occur at least as much within the various systems as by choosing among them.

APPENDIX

OPERATIONAL DEFINITIONS OF THE VARIABLES

Race/ ethnicity	White, black, Hispanic, other (includes Native American and Asian) (white = reference group)
Gender	Male, female (female = 1 and male = reference group)
Region	Northeast, North Central, South, West (North Central = reference group)
Area of residence	Rural or other (urban, suburban) (rural = 1 and other = reference group)
Socioeconomic status (SES)	A created index of parents' occupation and education as well as household items, for respondents at age 14

The following criteria were used to classify students as limited English proficient:

- The student had taken the base-year questionnaire in Spanish

OR

- The student reported the first language spoken as one other than English AND

  -- reported taking an English course for non-English-speaking students in grades 10 - 12

  OR

  -- reported taking a reading and writing course in first language spoken (not English) in grades 10 - 12

  OR

  (such as math or science) taught at least in the first language spoken than English) in grades 10 - 12

(LEP = 1)

Handicapped — The following criteria were used to classify students as handicapped:

- The student reported being in a special program for educationally or physically handicapped

OR

- The student had one or more of the following conditions: specific learning disability, visual handicap, hearing impairment, deafness, speech disability, orthopedic, or other health impairment/physical disability AND reported having a physical condition that was limiting.

(handicapped = 1 and = reference group non-handicapped)

Vocational High School — A student's school was classified as a vocational high school based on a response to the school questionnaire.

Comprehensive High School — Students were classified as attending comprehensive high schools by responses to questionnaire items--similarly to the way vocational high schools were categorized. However, in addition, a question on the Supplemental Data Collection survey was examined. If the school administrator indicated that less than 50 percent of vocational courses could be taken away from the home school, then the school was classified as comprehensive.

Area Vocational Center — Students were classified as attending area vocational centers when they or their school administrator indicated the school was comprehensive (in the same way comprehensive high schools were identified) and, based on the Supplemental Data Collection, school administrators indicated that over 50 percent of courses in students' specialties were taken outside of their primary school.

(Vocational high school = 1, area vocational center = 1, and comprehensive high school = reference group)

Vocational education pattern	High school pattern was determined first by using student transcripts, if possible and if not by using a student's self-report. In the descriptive information, high school pattern is broken down into three areas of vocational pattern: o Concentrator o Limited Concentrator, o Concentrator/Explorer In the regression analyses, respondents in the Explorer and Incidental Personal areas were merged into either the Academic or the General pattern. (General = reference group)
Student high school curriculum pattern classification using high school transcripts	A student earning credit in any area of vocational education was categorized into one of the patterns of vocational education: Concentrator, Limited Concentrator, Concentrator/Explorer. This was done in the following way. Each of the patterns has values for intensity, diversity, continuity, supportive diversity, and proximity that are characteristic of an average member of that pattern. The differences between these characteristics and their corresponding values held by the student were computed and squared for each of the patterns. The squared differences were summed within each pattern and the pattern with the lowest score is the classification given to the student.
Verified self-report	Verified self-report was used to determine a student's high school curriculum pattern when no transcripts were available or a person's transcripts were invalid. Selected questions in the first follow-up questionnaire were used to determine a student's curriculum, as reported by that student. Student who reported taking 2 or more years of coursework in a single vocational service area--business, trade & industry, technical, or other (agriculture, health occupational, home economics, distributive education)--were classified as having taken a "vocational" curriculum pattern.

Specialty	The Vocational Specialties are Agriculture, Business, Health Occupations, Trade & Industry, Occupational Home Economics, and Distributive Education. If students earned 1 credit total and at least 60 percent of their vocational credits were earned in one area, then that area was their specialty. (Business = 1, Trade and Industry = 1, and other specialties are the reference group).
Postsecondary	Currently enrolled, not currently enrolled (never enrolled = reference group)
Postsecondary education--years completed	Completed 0 years Completed 1 year Completed 2 years Completed an indeterminate number of years (never enrolled = reference group)
Academic ability	Composite of reading, vocabulary, and math scores from tests administered with survey
Self-esteem	Additive score of various self-esteem questions asked of students in the 10th grade. High values correspond with high self-esteem.
Training-related (TR)	A person's occupation and industry area were determined based on the Census 3-digit code for occupation. Person's whose vocational specialties matched their occupation areas or a combination of occupation and industry were designated as being in training-related (TR) areas of work. Thus, in the regression analysis, the following categories appear: Concentrator (TR), Limited Concentrator (TR), Concentrator/Explorer (TR) and Self-Report Vocational (TR).
Log hourly rate of pay	Log of reported hourly rate of pay for current or most recent job
Log monthly rate of pay	Log of reported monthly rate of pay for current or most recent job
Labor market experience	Number of weeks worked since graduation from high school or, if no graduation date was available, from the date of 18th birthday.

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